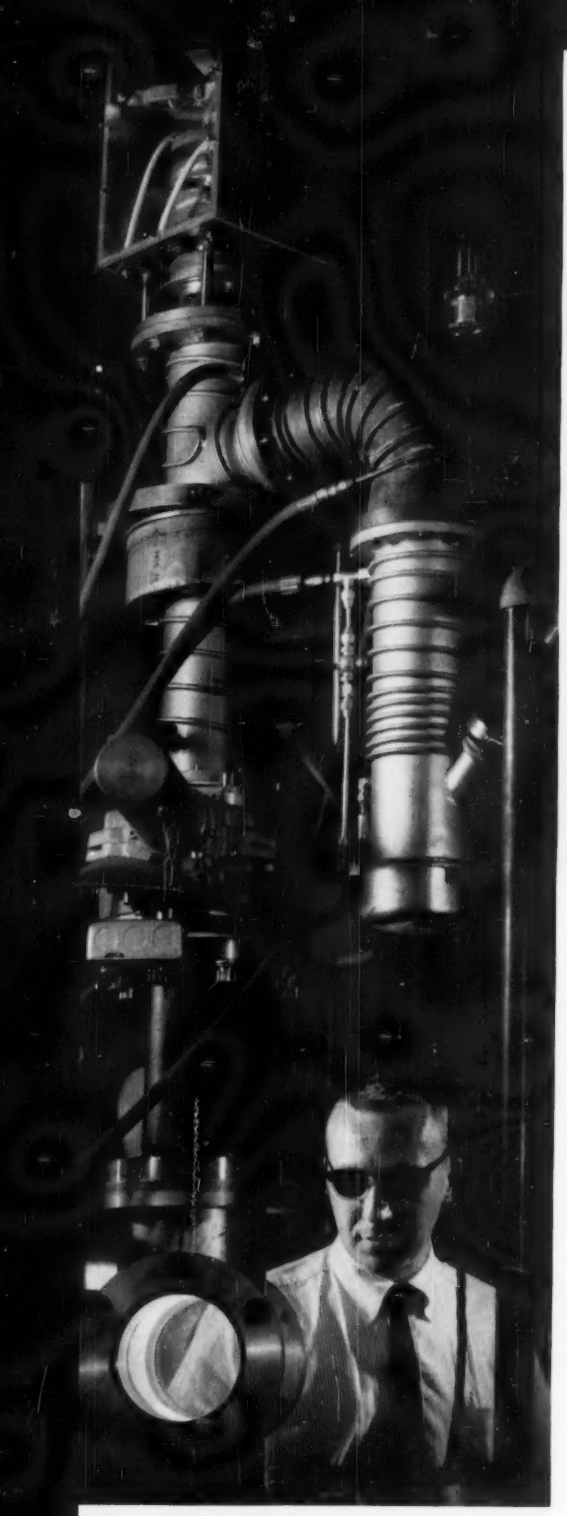

## Electron Beams Go to Work

Equipment, like this at General Electric Co.'s research laboratory, is fast making the electron beam a production tool for melting, welding, and machining. See Page 124.

STEEL

*The*

# Metalworking Weekly

SEPTEMBER 12, 1960

A PENTON PUBLICATION

## Machine Tool Exposition—1960: Will It Spur Capital Spending?

## Navy's Antisub Program Stirs New Look at Wealth Beneath the Seas

## Pressure Bonding Solves Problem Of Joining Dissimilar Metals

## Use Your Suppliers' Brainpower

No. 19 in STEEL's Program for Management

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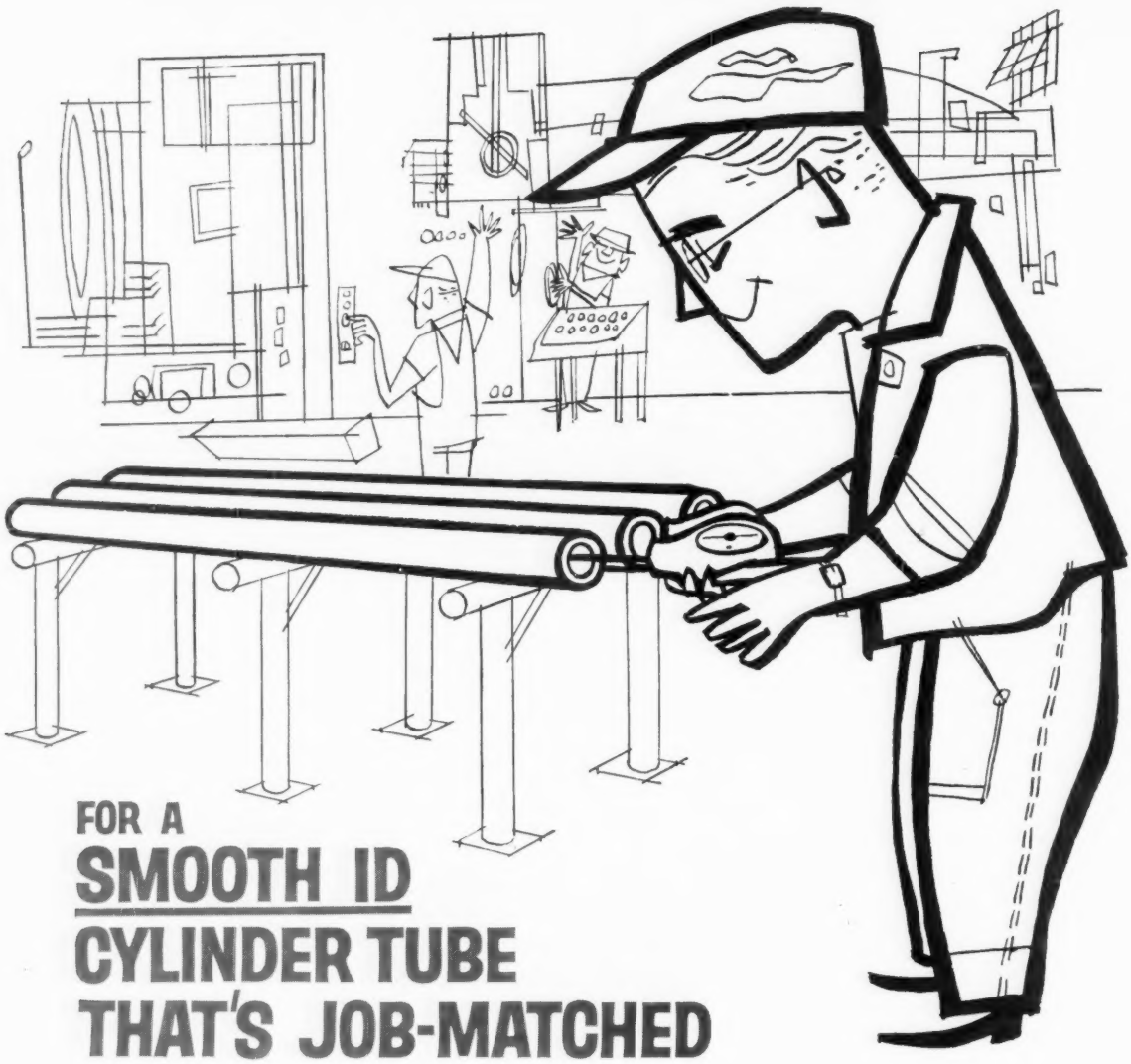

# FOR A SMOOTH ID CYLINDER TUBE THAT'S JOB-MATCHED

## SPECIFY

## B&W *Lectrosonic steel cylinder tubing*

**With B&W LECTROSONIC you get . . .**

- guaranteed maximum micro-inch finish on the ID to meet cylinder tubing requirements
- uniformity of wall thicknesses and close ID tolerances
- guaranteed physical properties to insure adequate strength
- tough, lightweight electric-resistance-welded cylinder tubing that costs less than seamless in comparable sizes.

Manufactured under a rigid system of quality control B&W LECTROSONIC Cylinder Tubing is a sound, uniform tube which will fabricate easily and give optimum service life. For more information, call your local B&W District Sales Office, or write for Bulletin T-459. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

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Steel Arena
1960 METAL SHOW
PHILADELPHIA
OCT. 17-21

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Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

This Week in STEEL The Metalworking Weekly

September 12, 1960 Vol. 147 No. 11

## Machine Tool Show: Will It Spur Capital Spending?

That is the question uppermost in the minds of equipment builders displaying and demonstrating their latest models in Chicago this week. They won't get an answer until machine users have a chance to appraise the offerings and match price tags against budget figures. PAGE 79

## Down to the Sea: New World for Industry to Conquer

Concerned about the submarine menace, the Navy is increasing its budget for basic research in oceanography (the study of the ocean's geography and related matters). Metalworking is benefiting immediately in equipment and research contracts. Long term benefits will come from information gathered that could lead to undersea mining. The ocean is literally loaded with minerals and chemicals. One authority reports heavy metals of economic importance are incorporated in disorganized layers of ferromanganese minerals on ocean bottoms. PAGE 82

## Materials Efficiency—Use Your Suppliers' Brainpower

President George Romney of American Motors Corp. is telling venders of parts for Ramblers that AMC "can progress most effectively by drawing intelligently on the greater reservoir of skill and capacity built up by our suppliers." This article sets forth five approaches to help in implementing Mr. Romney's idea. PAGE 89

## Pressure Bonding Handles Dissimilar Metals

Scientists at Battelle Memorial Institute feel that solid phase, high pressure, or gas diffusion bonding can be immediately practical in preparing parts for defense equipment. For instance, they say that beryllium may make the transition to practical applications sooner than expected. Right now, they claim the method is shaving joining costs in making clad fuel elements for atomic reactors from difficult refractory metals. Work at Battelle was done on the high pressure reactor vessel pictured. PAGE 144

## Without Cuba—Still Enough Nickel

Without counting Cuba, Free World capacity next year will be 649 million lb—42 per cent more than Free World consumption in 1959. U. S. holds 100 million lb of metal in the Defense Production Act inventory, and stocks of Nicaro nickel oxide sinter in this country have been increased 25 million to 30 million lb. PAGE 173

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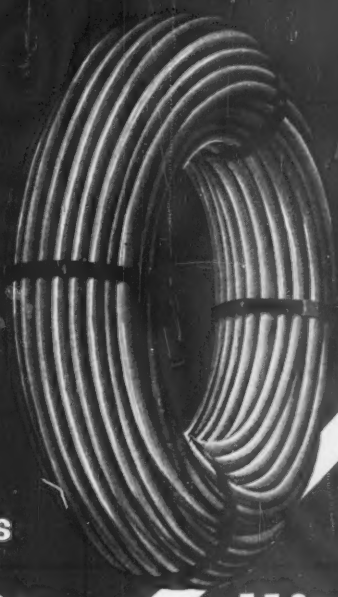
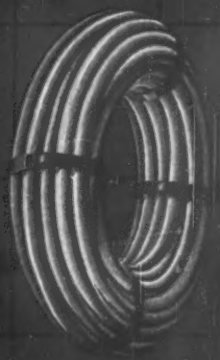
# HEAVY COILS

OF BETHLEHEM STEEL BARS

## Push Profits Higher





## ...less downtime...greater production

For shops using steel bars in coils, a change-over to heavier coil weights is a sure way to greater profits. Each machine in your shop will produce more product per day with considerable less supervision.

The use of heavyweight coils allows longer continuous runs at full-production speed. Downtime is reduced, often by as much as 15 per cent. Production per man hour is boosted.

For full details on these cost-saving heavyweight coils, or for information about the lighter coils we produce, check with the nearest Bethlehem sales office.

**Bethlehem steel bars available in 1750-lb coils** New facilities on our 10-in. bar mill at Lackawanna, N. Y., enable us to produce heavyweight coils in these sizes:

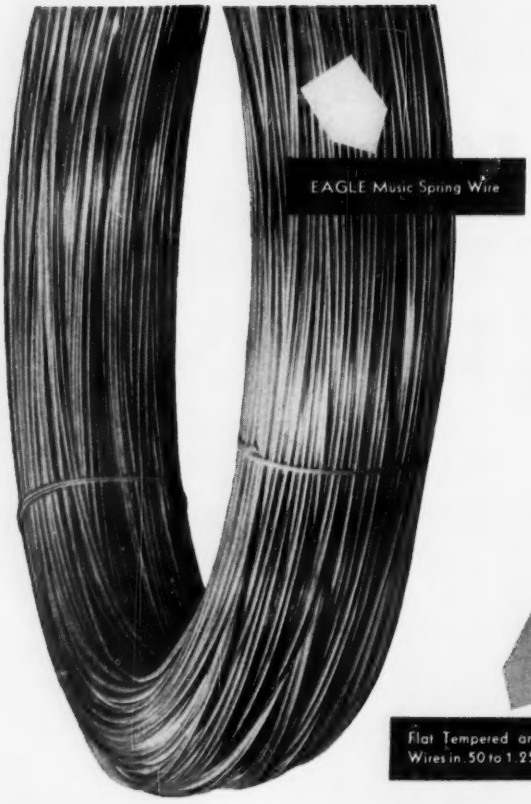
| ○ □ ⬡ | SIZE RANGE, in. | COIL WEIGHTS, lb., average |
|---|---|---|
| ROUNDS | 3/64 to 5/64<br>13/16 to 1 5/16 | 850, 1600<br>850, 1600, 1750 |
| SQUARES | 5/16 to 13/16<br>27/32 to 1 1/8 | 850, 1600<br>850, 1600, 1750 |
| HEXAGONS | 5/16 to 13/16<br>27/32 to 1 1/4 | 850, 1600<br>850, 1600, 1750 |

Steel *for Strength ... Economy ... Versatility*

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. *Export Distributor:* Bethlehem Steel Export Corporation

**BETHLEHEM STEEL**

BETHLEHEM STEEL




# Here is the WASHBURN WIRE FAMILY

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TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

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# Get small heads from COMMERCIAL...fast!

**We'll load to best suit your receiving facilities—crane, lift truck or manual.**

COMMERCIAL daily ships small tank heads 6" diameter and larger—one head or a full load—to tank builders nationwide. COMMERCIAL has a complete range of sizes—all the standards, many specials. Many rush requirements are shipped right out of stocks available at Youngstown, Ohio, Chicago, Ill., and Salt Lake City, Utah.

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COMMERCIAL heads are economical to use. Precision formed in steel dies, they are consistently uniform, right on size. Flanges are straight—fit into shell easier—ideal for automatic welding. They have been preferred by better tank builders for over 30 years.

For full information on small tank heads, whether from stock for immediate delivery or made to your special order, write to Commercial Shearing & Stamping Company, Dept. L-38, Youngstown 1, Ohio.

Specialists in the shape of things to come

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# 9 trouble-free years— still no trouble in sight

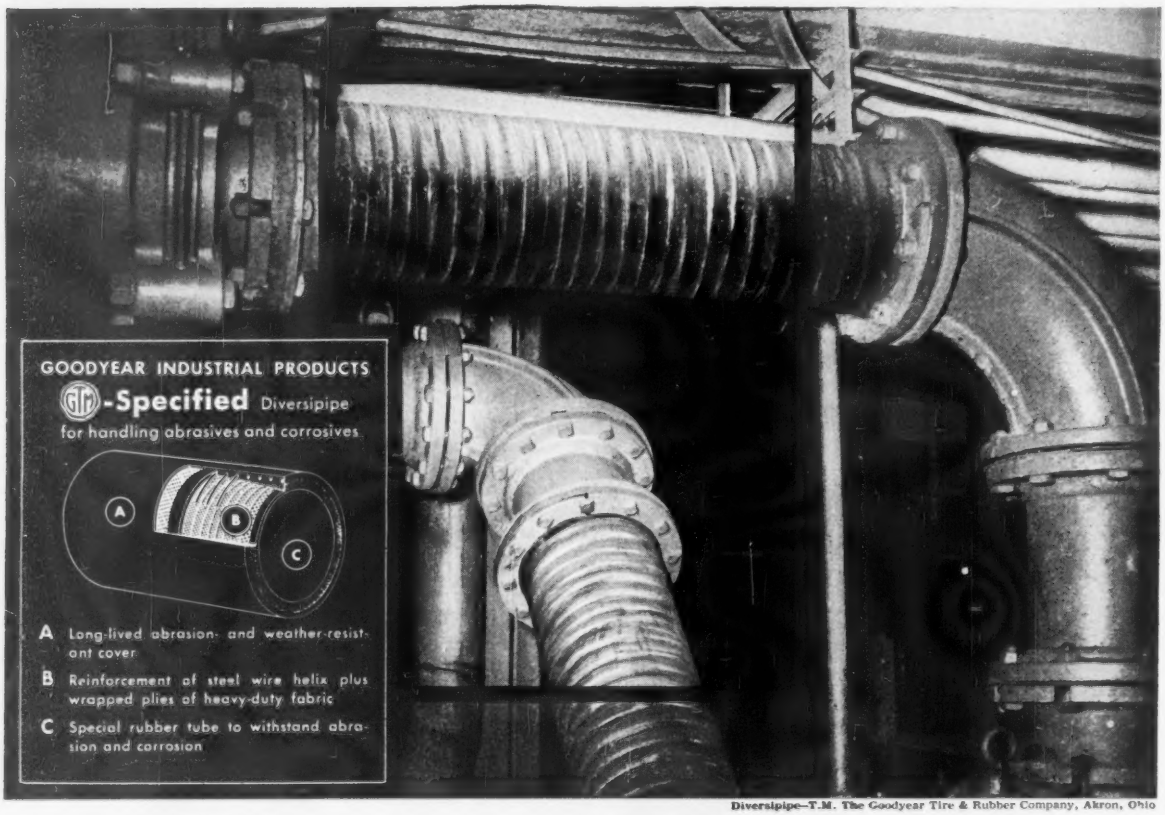
HANDLING the murderous abrasion of iron-ore slurry was only part of the problem when they added new facilities at this big Northeastern mine. There was also incessant vibration from pumps and refiners—certain to encourage leakage and shorten the life of just about any kind of slurry lines used.

But not if the lines were Diversipipe: recommended by the G.T.M.—Goodyear Technical Man. That super-tough rubber pipe fights off abrasion—absorbs shock. A bonus benefit: its flexibility makes intricate installations easier and less expensive.

At last report, the Diversipipe had been handling minus 14 mesh slurry—at 10 feet per second—for 9 straight, trouble-free years. And it's still giving like-new performance.

In fact, Diversipipe has proved the moneysaving answer to tough material-handling problems like this in many a plant. For expert tips on handling pumpable materials—especially abrasives or corrosives—check with the G.T.M. through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

**IT'S SMART TO DO BUSINESS** *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*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for handling abrasives and corrosives
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B
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A Long-lived abrasion- and weather-resistant cover
B Reinforcement of steel wire helix plus wrapped plies of heavy-duty fabric
C Special rubber tube to withstand abrasion and corrosion

Diversipipe—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

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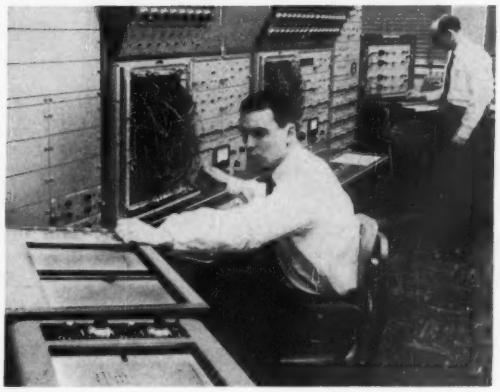


## The New Look in Steel Mills . . .

. . . of tomorrow may be foretold by analog computers like this one. This unit, installed by Jones & Laughlin Steel Corp., Pittsburgh, is used to simulate complex metallurgical and mechanical processes electronically.

For a closer view of the machines and equipment that will produce the ingots and coils of the future, we refer you to our next week's issue. It will feature a special section in recognition of the meeting and show of the Association of Iron & Steel Engineers, Sept. 27-30, in Cleveland.

Ten STEEL editors turned out an interpretive progress report that shows how steelmakers will meet the promises and challenges of the sixties.

## History Reveals the Need

In five years (1955 through 1959) the U. S. share of world steel production dropped 11 per cent. To help stem the slide, U. S. firms are initiating a multibillion dollar program for improving finishing facilities—with emphasis on flexibility and efficiency. Involved: About $1 billion a year. Our editors will give a rundown of the most important new methods and tell how they're progressing.

## Progress in Products

The products on the drawing boards today are the profitmakers of tomorrow. The editorial team did some probing to find out what major improvements are being sought for present products and what new products are near debut.

They asked steel companies to tell what new or improved processes and techniques of making and shaping steel will be in the forefront in the present decade.

The editors also asked officials what they think are the greatest technological needs of the steel industry.

The convention program and some of the new equipment that will be exhibited at the show will round out the features in the special section next week.

## Beware the Setting Star

"I compliment you on your July 11 editorial, 'Lesson from Toshiba,'" writes M. B. Pendleton, president, Pendleton Tool Industries Inc., Los Angeles.

"We thought enough of the film to show it to our management group . . . it made them think.

"In the same issue (Page 35), you talk about a fastener firm tooling up to meet foreign competition. This is the kind of challenge you should fling at American industry generally . . .

"Our executives are exploring every possible angle to meet foreign competition . . . When our manufacturing people read such items in your magazine . . . it gives them a challenge, a lift, and a pat on the back and elsewhere, causing them to plead their case before management to get the equipment, encouragement, and the approval to do the same in their departments as the fastener firm did.

"Getting higher tariffs is not the answer. We are competing in world markets. If we can't get the orders . . . the Japanese, or Germans, or somebody else will. It nets down to the matter of drive, efficiency, imagination . . . in our American plants. Featherbedding and complacency must . . . go out of the window (and be replaced) by dynamism, imagination, and doing the impossible . . . or the star of American productivity will slowly set within your and my business lifetime."

## Some Personal Observations . . .

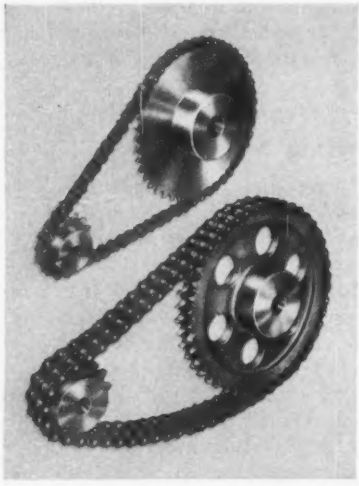
. . . on industrial relations in Japan came our way from Harold R. Nissley, management consultant, Cleveland. He notes: "Despite the high level of efficiency in some factories, I was surprised at the eagerness of executives and engineers—they made notes on everything I said and pressed me for more suggestions . . .

"Once a person is hired, a Japanese employer assumes a moral obligation to look after him up to the age of 55. Then the worker is retired,

DO YOU HAVE THE PROPER

CHAIN SELECTION

FOR YOUR EQUIPMENT?



If there is a question in your mind about the correct size of chain to use for your particular installation, ACME Engineers will gladly assist you in selecting the proper chain drive. This depends on how much horsepower you want to transmit . . . the speed and size of your shaft . . . space limitations . . . hours of continuous operations, etc.

*Consult your nearest ACME Distributor or write our Engineering Department for the answer to your CHAINING PROBLEMS.*

*Write Dept. 10-S for new 100-page illustrated technical catalog including new engineering section showing 36 methods of chain adjustments.*

Acme Chain Corporation
HOLYOKE MASSACHUSETTS



usually with a modest pension. It is difficult for a worker to get a job elsewhere if he leaves a company. If an employee doesn't make good on one job, the employer tries him on another. A round peg in a square hole may wind up as a handyman around an executive's home. This paternalism goes to the point of matchmaking for unmarried workers. Newlyweds get two weeks' vacation for a honeymoon . . .

"Little used expressions did not stop interpreters. Use of 'Caesar's wife must be above suspicion,' came out: 'An honest man will not stoop to tie his shoelaces when walking through another man's cucumber patch.'"

## The Thirst for Knowledge . . .

. . . both technical and business, is rampant everywhere. Requests from other countries show the same degree of completeness and an unabashed, almost aggressive willingness to learn. Among the many the Servicenter has received:

**Australia**—Advances in flat steel processing . . . **England**—Continuous casting of steel . . . Mexico—Inspection of galvanized metal . . . **France**—Manpower problems posed by technological progress . . . **Argentina**—Special packaging of steel . . . **Germany**—Financing small steel warehouses . . . **Brazil**—Treatment and recovery of nonferrous scrap . . . **Israel**—Advertising and sales promotion of fasteners . . . **Belgium**—Extras and deductions applying to steel mill products . . . **Italy**—Cold lubricant uses . . . **Japan**—Distribution of steel in the U. S.

## You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—September, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Nov. 1.**

# Towmotor backs up outstanding performance

# with Towmotor dependable service

When you purchase Towmotor equipment you can be sure it will never be out of service very long . . . for two very good reasons:

1. Towmotor fork lift trucks are built to last, and built to perform continuously.
2. When needed, you get fast and skillful repair and maintenance service from your local dependable Towmotor representative.

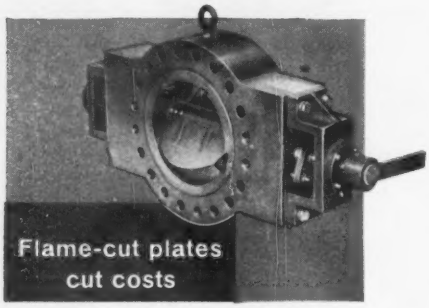
Your Towmotor representative will never let downtime cut into the money you *save* by owning a Towmotor fork lift truck! That's why Towmotor customers keep buying Towmotor equipment. Ask for complete information on Towmotor equipment and Towmotor Preventive Maintenance Service. Write Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR -GERLINGER
THE ONE-MAN-GANG ®

**FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919**

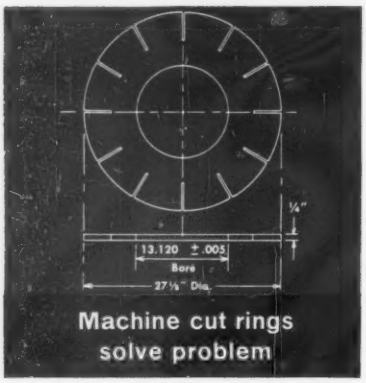
*Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

# METALOGICS* IN




**HIGH REJECTS:** Use of flat steel castings for valve bodies, with I. D. ranging from 4″ to 60″, accounted for increases in costs for this manufacturer. Pattern costs rose because of numerous changes . . . rejects were high due to porosity and other casting faults that showed up only after machining.

**HIGH QUALITY:** Ryerson recommended using flame-cut plates ranging in thickness from 1″ to 8″. Results: greater production flexibility, faster delivery, lower cost and a stronger product for this high-pressure service. Tight Ryerson quality control delivered plates of exceptionally clean surface to exact thickness of finished product, requiring little machining.




**PLATES REQUESTED:** Ryerson was asked to bid on supplying ¼″ Type 410 stainless in 27½″ square plates. Material was to be used for orifice plates for 16″ burner, subjected to elevated temperatures.

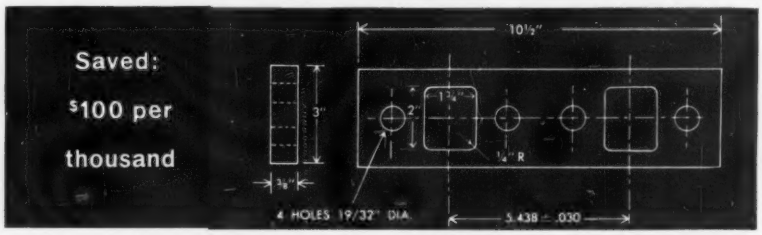
**RINGS RECOMMENDED:** Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛″-diameter rings with 13.120″ bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

Look at these random examples and see how Ryerson Metalogics sparks real savings by continually searching for and suggesting new materials, methods and techniques.

The broadest experience anywhere combines with the widest range of stocks available to offer you unbiased recommendations on the best material for any job—be it steel, aluminum or plastics. Always the right metal-fabricating machine, too—for Ryerson is the nation's largest distributor.

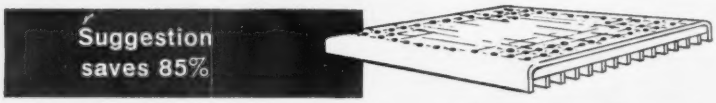
Your Ryerson representative is "Metalogics-trained" to help you *value-analyze* selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

**The Ryerson science of giving optimum value for every purchasing dollar.*




**PROBLEM:** Muffler manufacturer required accurately finished mounting plates made from ⅜″ x 3″ bar. Cutting bars to size, burning 1¾″ x 2″ holes and drilling four 19/32″ holes proved time-consuming and expensive.

**SOLUTION:** Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100.00 per thousand pieces and quickly justified the small initial investment in dies.




**ASKED FOR:** Customer wanted 1″ hot rolled plate to cover about 80′ of 24″ open trench. Plate was to be cut into 24″ x 27″ segments—each containing 900 ⅜″ holes to filter the product.

**RECOMMENDED:** After studying application and cost, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson experience and imagination saved 85% of the original cost.

## Soft touch on fabricating sheets

**THE NEED:** Cold rolled sheets that would take severe forming and retain smooth, dull surface for high lacquer finish. Sheet quality was found on inspection to vary widely from one shipment to the next, causing variations in forming and finishing operations . . . high reject rate.

**THE ANSWER:** The Ryerson representative showed how our stringent quality controls would assure consistent quality on every shipment so that forming and finishing could be standardized for better results . . . lower production cost figures

# ACTION

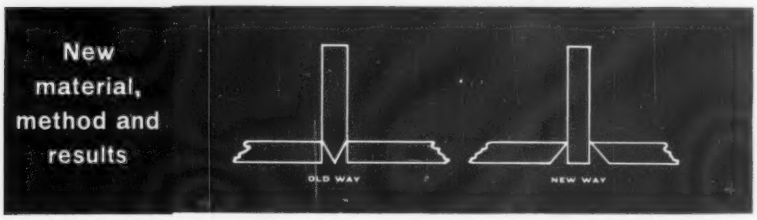
**BEFORE:** Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

**AFTER:** Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 s.f.m. and stepped up production 30%. Ryerson's stocks include the widest range of fast machining alloys—types and sizes to fit your every need.

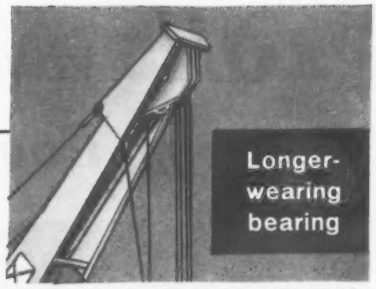
**OLD WAY:** A screw machine shop used nylon in the manufacture of nipple adapter and coupling nuts—until a Ryerson representative came on the scene.

**NEW WAY:** At his suggestion, they changed to Ryertex-Omicron PVC—cut costs 50%. PVC machined better—to closer tolerances, with improved finish . . . ran faster without "gumming." Note exact cutting of threads and barbs. Threads fit perfectly.

**SEARCH:** Complicated machining of a carbide grade gear shaft included cuts up to ½". It was discovered that required machining was too slow with the steel chosen for the job.
**ANSWER:** Rycut® 40 was recommended by the Ryerson representative. This free machining alloy fit the situation perfectly. The company found that Rycut 40 machined at 250 s.f.m., gave a better finish, increased tool life, and lowered total per-piece cost. An alloy in the Rycut series may well lower your costs.




**OLD:** Rows of vertical aluminum grid members were attached to an aluminum base plate by notching the grid members and welding. (2024-T3 aluminum plate was used.) However, upon cooling, welds fractured—causing a high reject rate on this assembly.
**NEW:** A Ryerson representative suggested undercutting the base plate (as shown) instead of the grid members. This exposed a greater area to heat and permitted a larger deposit of weld material. Another Ryerson suggestion: change material to 5052-H34 aluminum, which responds better to welding operations.




**5-DAY LIFE:** The sheaves that guide the enormous digging buckets of underwater dredges take a very severe load. Bronze bearing in the sheaves had to be replaced every four or five days.

**5 MONTHS, SO FAR:** After discussing the problem with a Ryerson man, the chief engineer decided to try a bearing made of Ryertex. The change was made, and five months later hardly any wear was noticeable! With its low friction coefficient, Ryertex is nonbinding, even on itself.

## 2 metalworking machines for the price of 1

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**METALWORKING MACHINERY**—the broadest line available from a single source for every kind of metal fabrication. Also specialized line of material handling equipment.

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Closeup of ring rolling, showing edging roll and portion of ring.

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**Edgewater Steel Company**

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## CALENDAR OF MEETINGS

**Sept. 12-13, Industrial Truck Association:** Fall meeting, Cavalier Club, Virginia Beach, Va. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

**Sept. 12-15, Society of Automotive Engineers Inc.:** National farm, construction, and industrial machinery meeting; production forum; and engineering display, Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

**Sept. 13-15, American Chemical Society:** Fall meeting and exhibit, Statler-Hilton Hotel, New York. Society's address: 1155 16th St. N.W., Washington 6, D. C. Executive secretary: Alden H. Emery.

**Sept. 13-16, Electronic Industries Association:** Fall meeting, French Lick-Sheraton Hotel, French Lick, Ind. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

**Sept. 14-15, American Die Casting Institute:** Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

**Sept. 14-16, National Industrial Conference Board Inc.:** General session for all associates on marketing, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

**Sept. 15-16, American Society of Mechanical Engineers:** Engineering management conference, Morrison Hotel, Chicago. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

**Sept. 15-16, Refractories Institute:** Annual meeting, Broadmoor Hotel, Colorado Springs, Colo. Institute's address: 1801 First National Bank Bldg., Pittsburgh 22, Pa. Executive secretary: Avery C. Newton.

**Sept. 18-21, Packaging Machinery Manufacturers Institute:** Annual meeting, Otsego Ski Club, Gaylord, Mich. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive director: Russell L. Sears.

**Sept. 19-20, Steel Founders' Society of America:** Fall meeting, Homestead Hotel, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

**Sept. 21-23, American Society of Mechanical Engineers and American Institute of Electrical Engineers:** Power conference, Bellevue-Stratford Hotel, Philadelphia. Information: ASME, 29 W. 29th St., New York 18, N. Y. Secretary: O. B. Schier.

**Sept. 22-23, National Foundry Association:** Annual meeting, Edgewater Beach Hotel, Chicago. Association's address: 53 W. Jackson Blvd., Chicago 4, Ill. Executive secretary: C. T. Sheehan.

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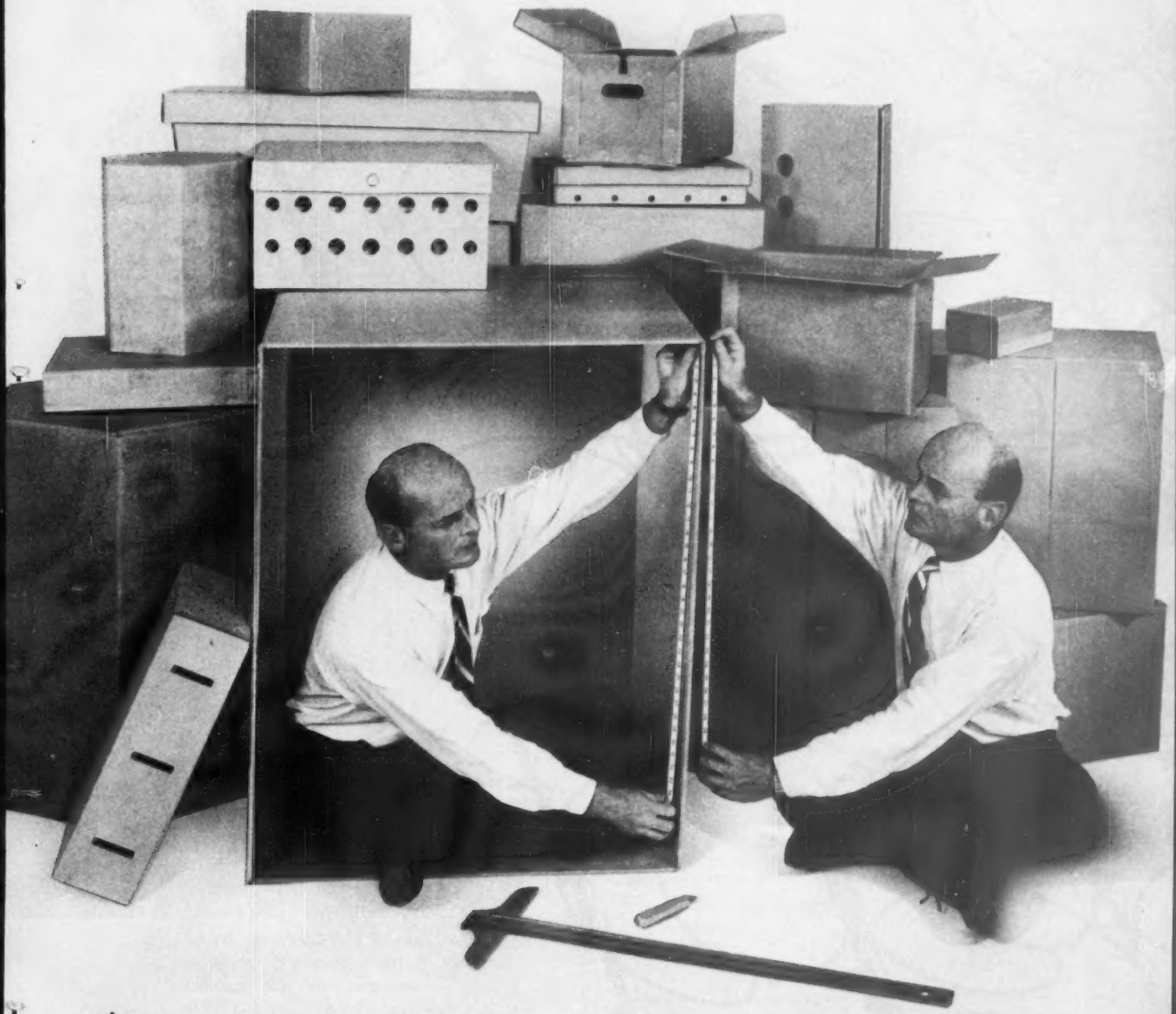

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**GAYLORD CONTAINER DIVISION**

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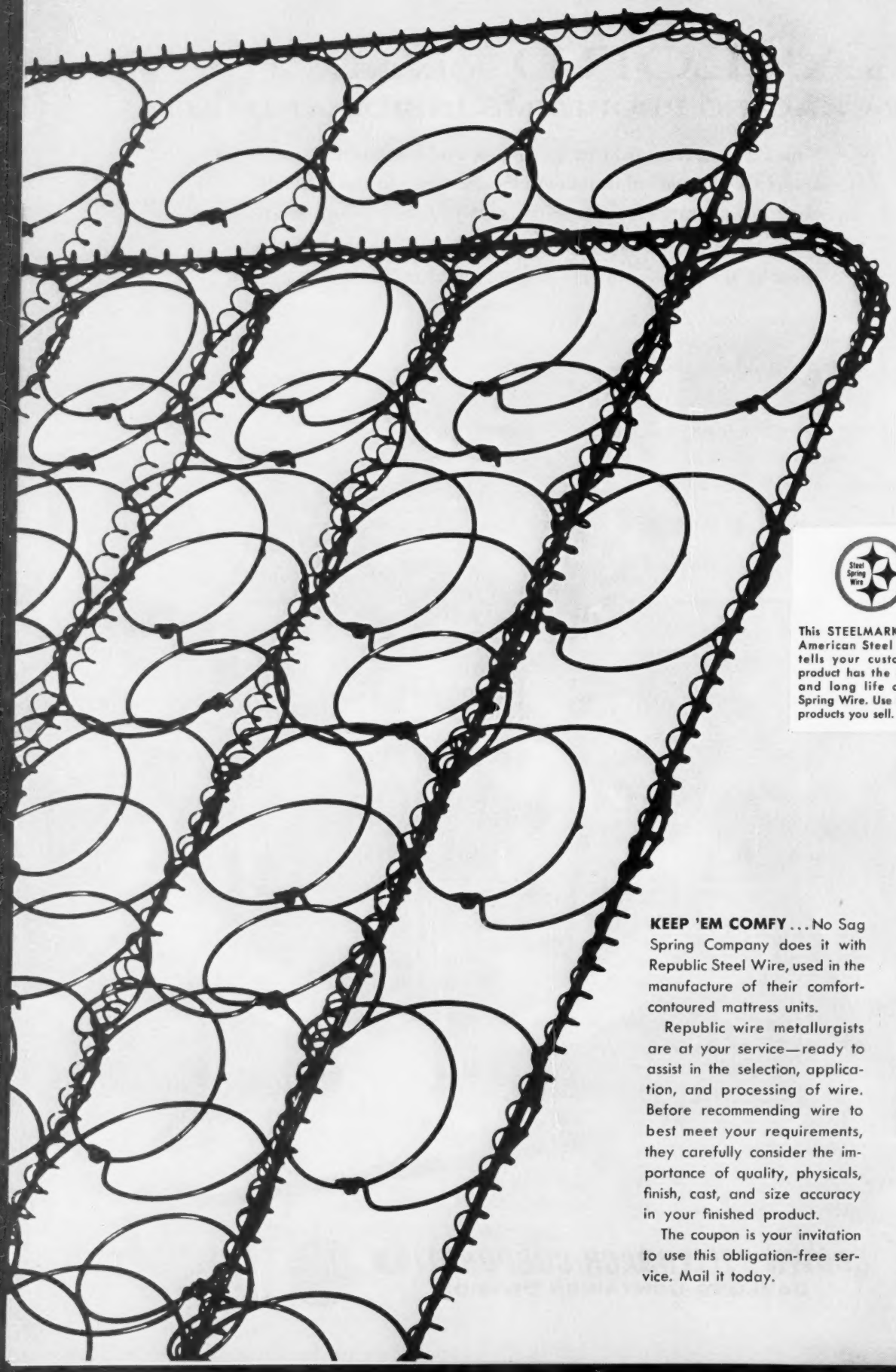

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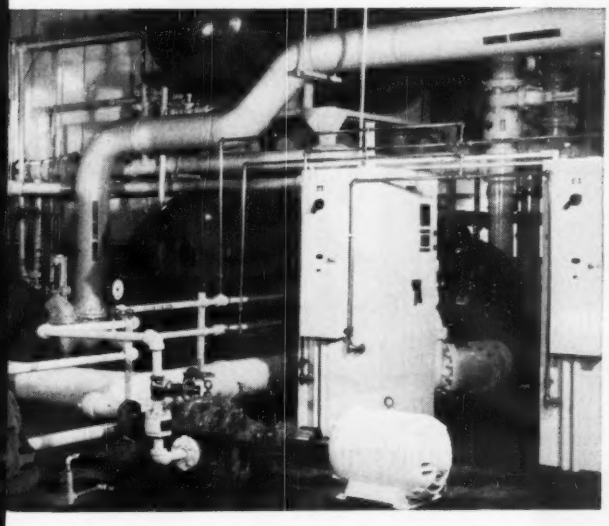

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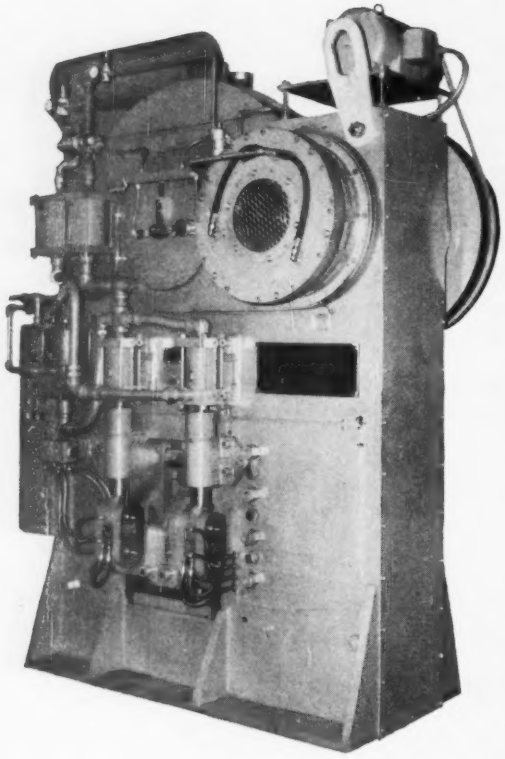

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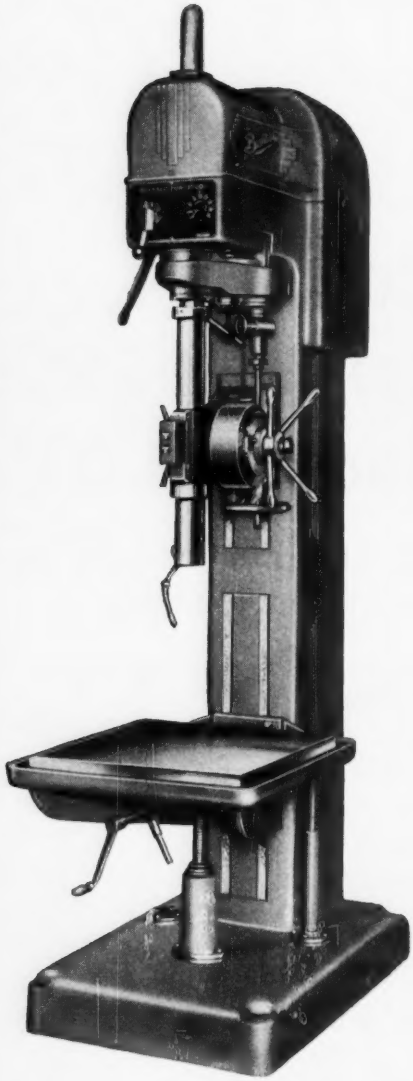

**DRILLS "IMPOSSIBLE" JOBS** — the matchless "RPMster" with instant fingertip speed control, all-geared power feed, nickel steel ball bearing back gears and full ball bearing alloy steel spindle. Available in 1", 1½" and 2" drill capacities. New **hollow spindle** permits use of advanced type bits in drilling exotic metals and other "impossible" jobs.

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Look at your obsolete, worn out equipment. Consider your loss in unit production, poor work quality. You can change this loss to a profit with modern *Buffalo* Machine Tools. Quality Built for years of extra production life, *Buffalo* Machine Tools are being used in every industry for production and plant maintenance. Look them over, there is probably a model that should be in your plant right now.

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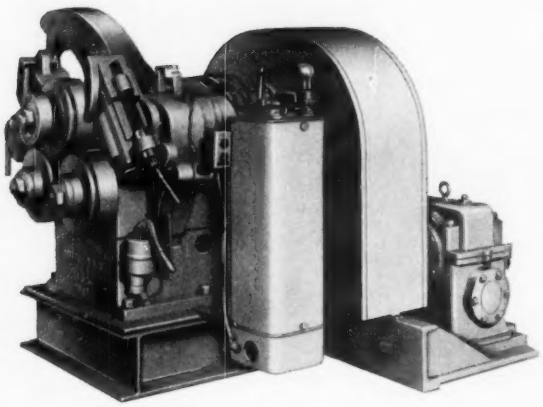
## BENDING ROLLS



**COLD METAL BENDING WITHOUT DIES** — Buffalo Bending Rolls handle angles, rounds, squares, tubes, pipes, flats, special shapes. Turn out commercially accurate circles, arcs and spirals at production speed. Setup is fast due to easily changed standard or special rolls and easy radius adjustment. Precision-built, heavy-duty machines, quality engineered throughout. New, compact speed-reducer drive means important savings in floor space.

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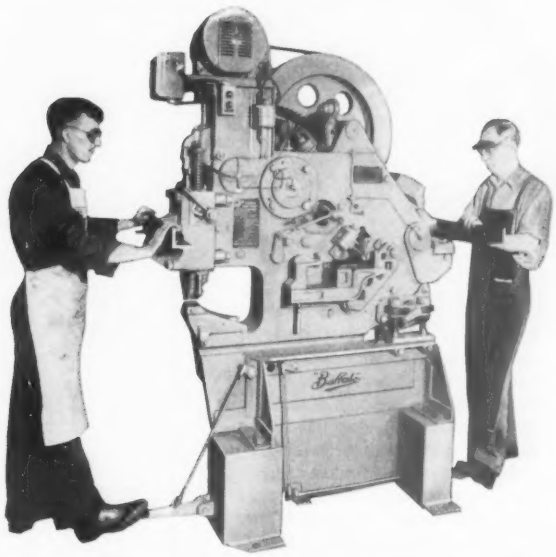
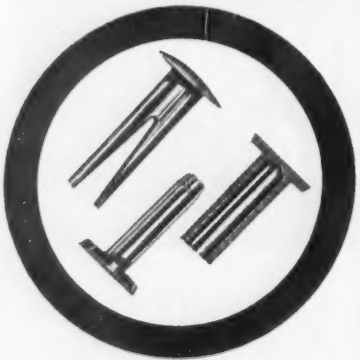



**SEVEN OPERATIONS — SAME MACHINE WITHOUT CHANGING TOOLS** — the Buffalo Universal Iron Worker. A rugged, versatile "1-machine shop" that cuts, punches, shears, slits, notches and copes — saves valuable shop space, makes short work of your maintenance and production fabrication jobs.

**COST PREVENTION... NOT COST REDUCTION... IS THE EFFICIENT WAY TO LOW-COST ASSEMBLY**



The 'in-place' cost of a fastener is what really counts to cost-conscious production men. By deciding on inexpensive Milford tubular rivets as a fastening method and installing them with Milford automatic rivet-setting machines, design and production engineers are eliminating costs at the initial production stage rather than trying to reduce costs later at the assembly line. Write for more information.

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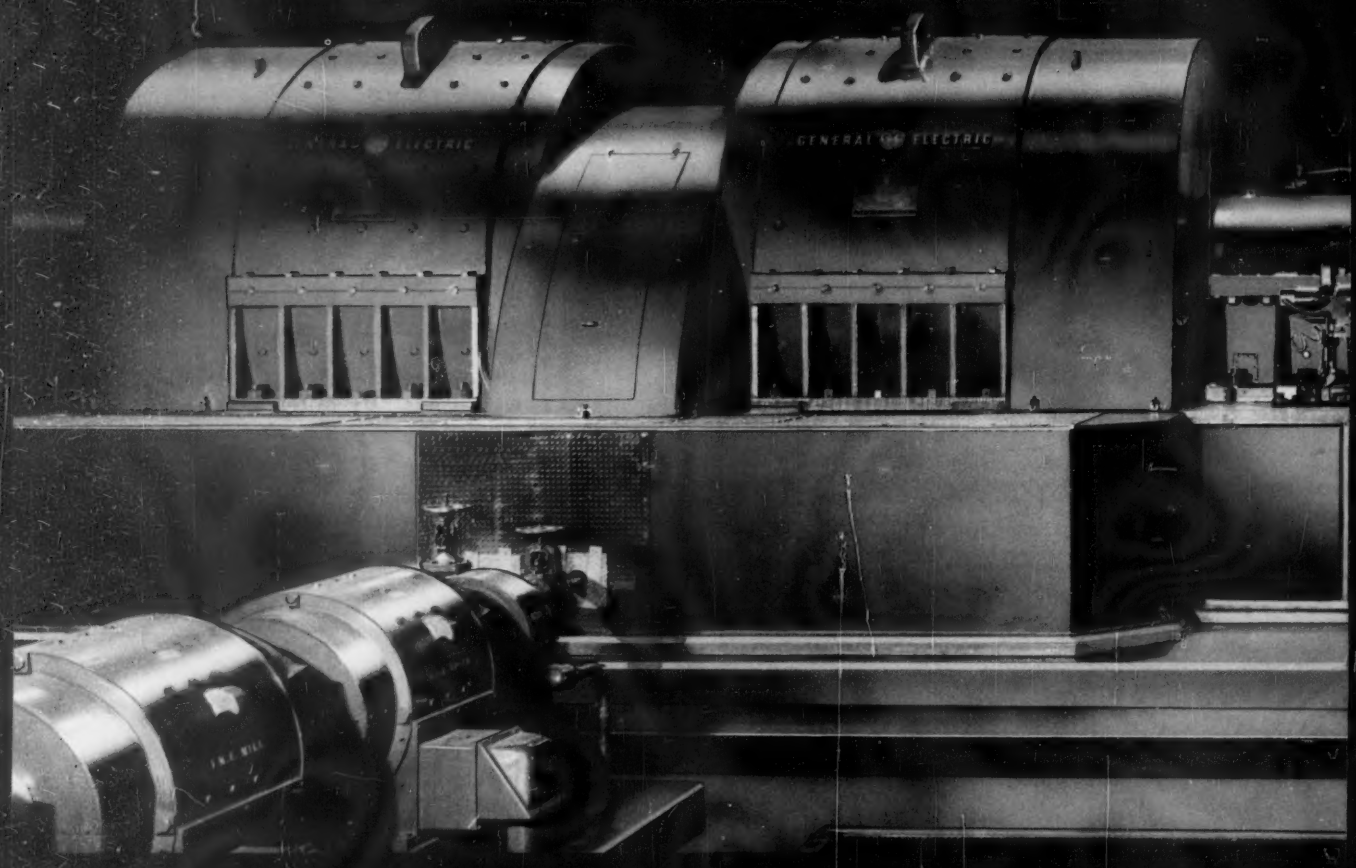
*Three Reasons General Electric D-c Drives are Best for*



# 1. Costly Maintenance Shutdowns Reduced

D-c Main Drives

In metal-rolling mills—where minutes of downtime are measured in thousands of dollars—fast, simplified maintenance of main drive motors is critical.

The revolutionary "TOP-FORWARD" twin-drive shown above exemplifies General Electric's continuing emphasis on better design for ease of maintenance. Shaft extension of the rear motor passes *beneath* the forward motor instead of directly over as in conventional designs. This unique drive arrangement allows clear access by overhead crane to all bearings, air-shields and other components of *both motors*.

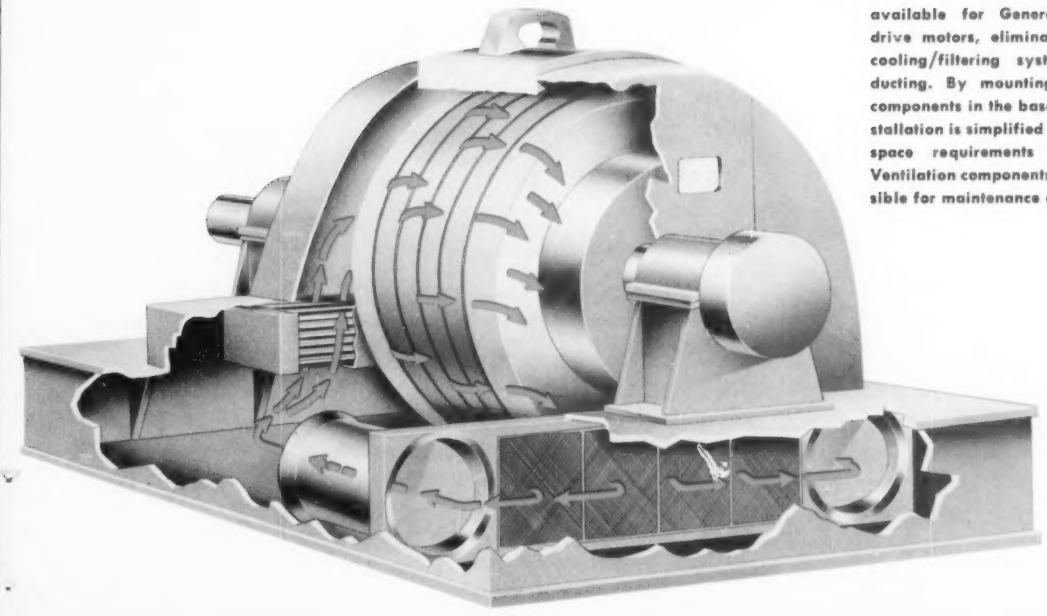
Shorter over-all length of drive substantially reduces space required and provides cost savings in foundation construction. Improved Class B Insulation system for armatures and fields, utilizing proven resins and compounds, provides greater resistance to heat, moisture and dirt.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

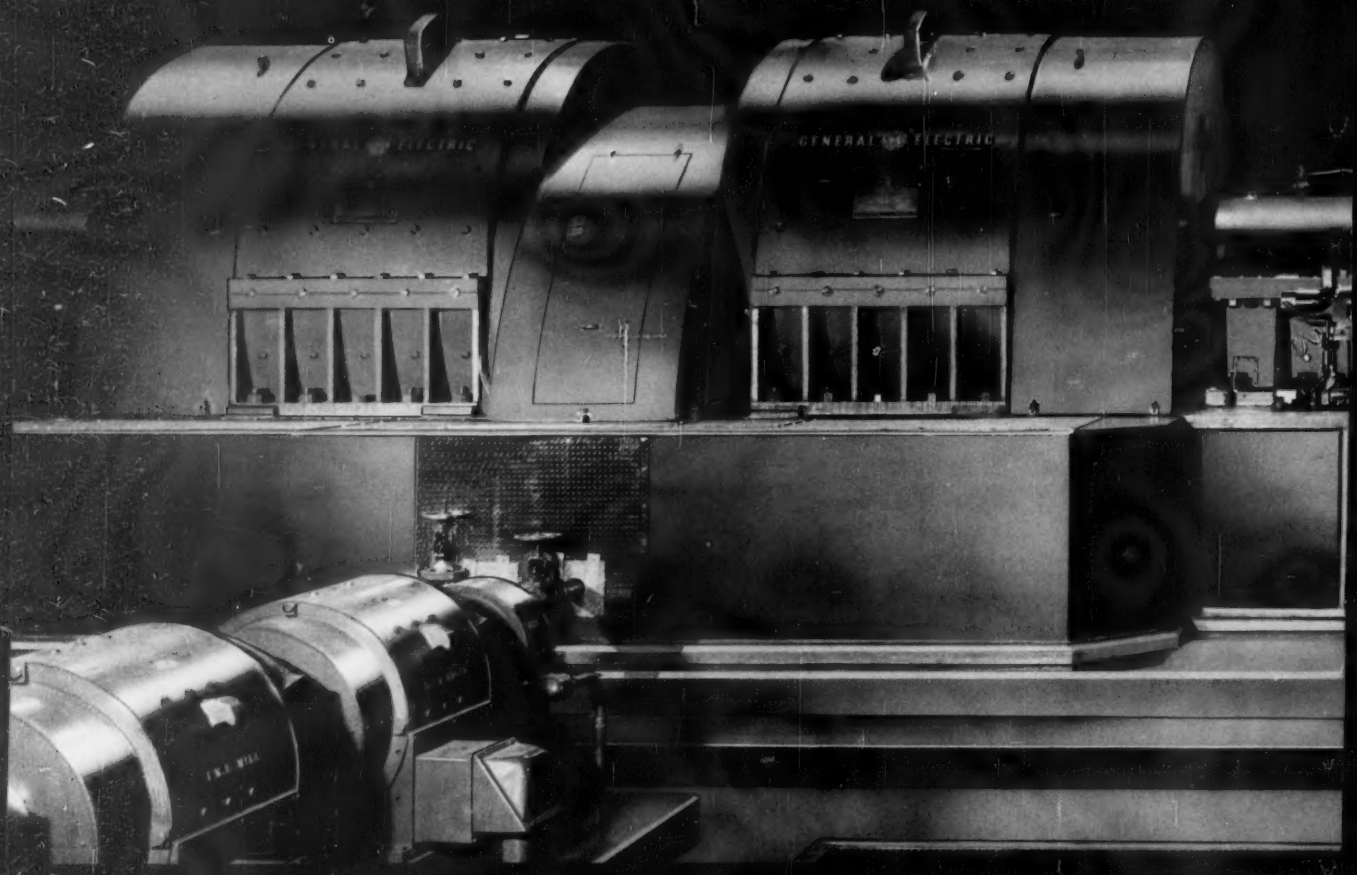
*Automated Production Systems*

# by New Advances in D-c Drive Design



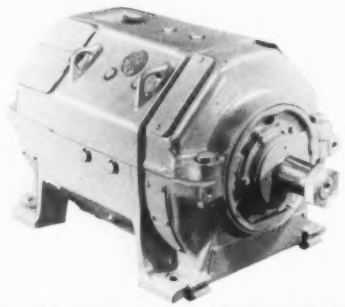
INTEGRAL VENTILATION SYSTEM, available for General Electric main drive motors, eliminates separate air-cooling/filtering system and related ducting. By mounting all ventilation components in the base of the drive, installation is simplified and supplemental space requirements are eliminated. Ventilation components are easily accessible for maintenance and inspection.

*Three Reasons General Electric D-c Drives are Best for*



# 2. G-E Drives Are Durable and Reliable—

D-c Auxiliary



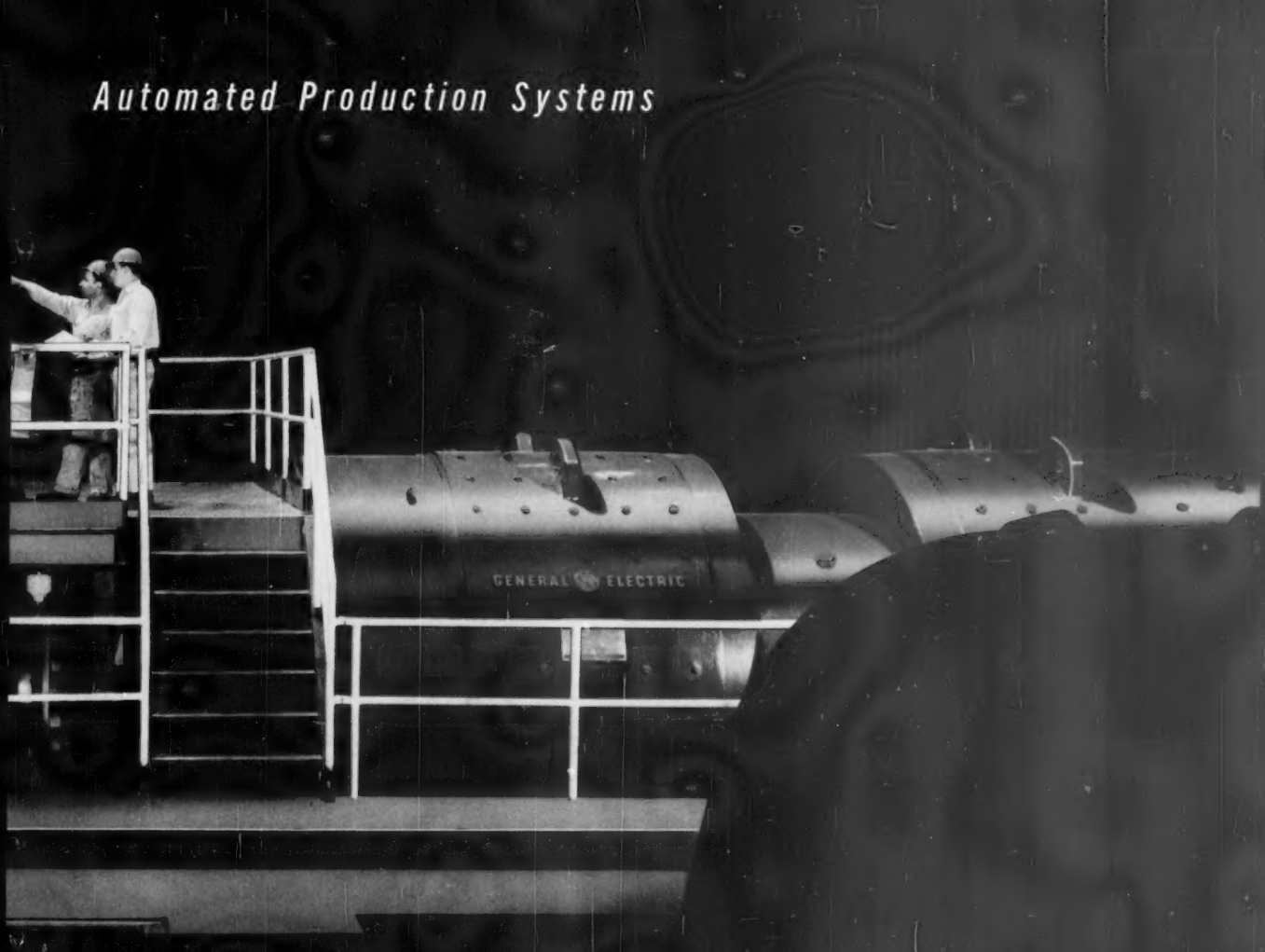
**GENERAL ELECTRIC'S MD-600 ARMORED MOTOR is built to withstand severe shocks, give maximum reliability. Class H insulation provides superior protection—permits greater work capacity.**

Designed to exceed the requirements of the most advanced continuous processing systems, General Electric MD-600 series armored mill motors are built to withstand regular exposure to hot scale, steam and corrosive sprays. Improved high temperature insulations have appreciably lengthened motor life.

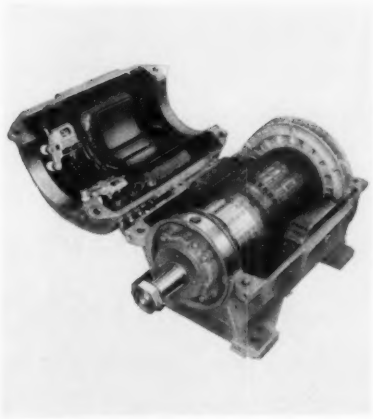
Designed to meet or exceed AISE standards in all respects, General Electric's armored motor offers unmatched flexibility. This motor can be adapted to fit any of five different ventilation requirements simply by adding or removing standard covers. No other modifications are necessary.

*Progress Is Our Most Important Product*

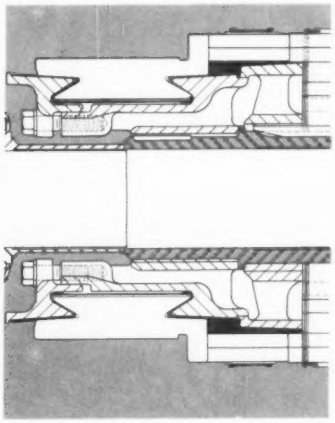
GENERAL ELECTRIC




# Meet Demands of Continuous Processing



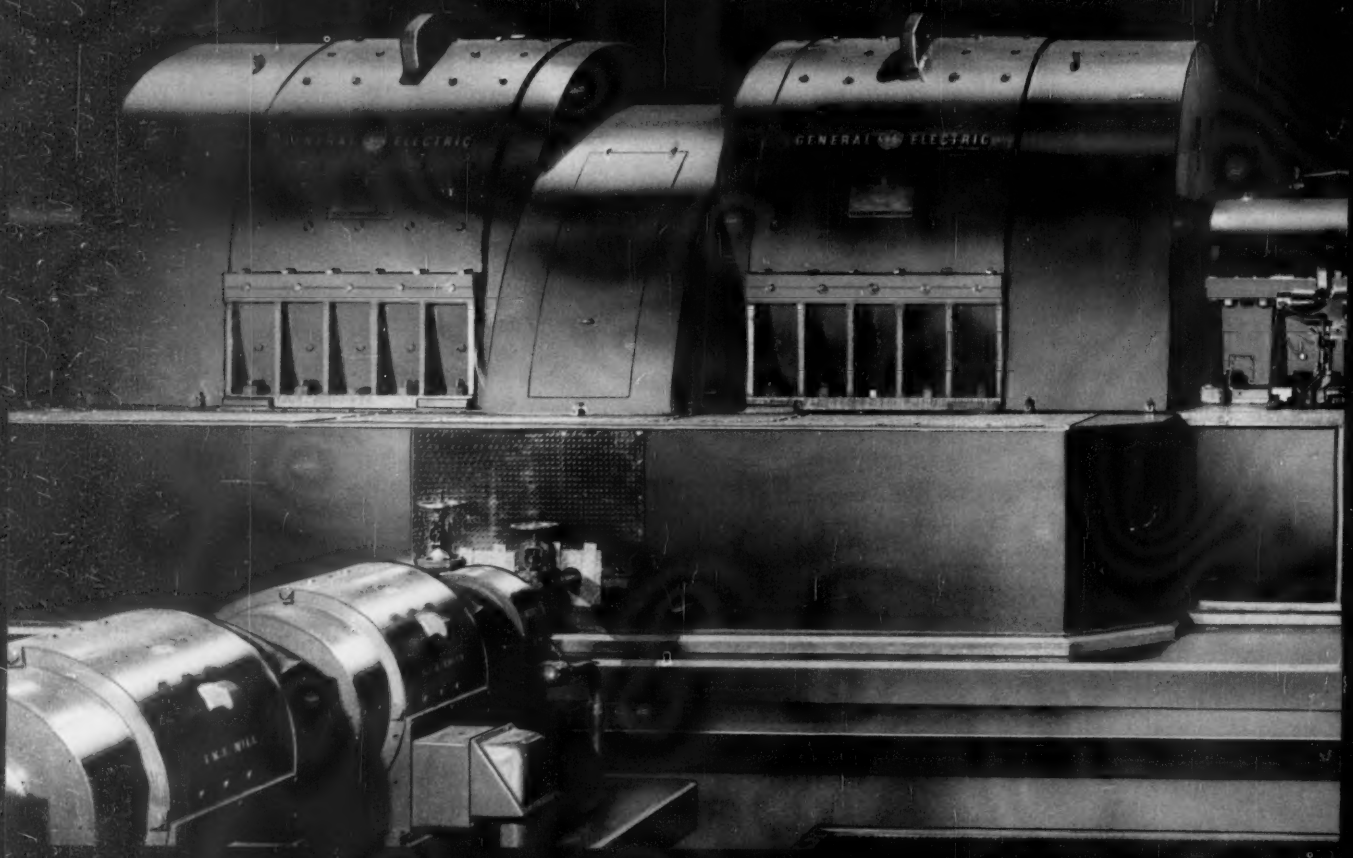
DESIGNED FOR EASY ACCESS, top half of General Electric MD-600 motor frame swings open nearly 180° to permit fast armature removal. Positioning keys in frame heads facilitate armature alignment.



DESIGNED FOR EASE OF MAINTENANCE, the armature on General Electric armored motors is assembled on a steel spider so the shaft can be pressed out without disturbing commutator or windings.

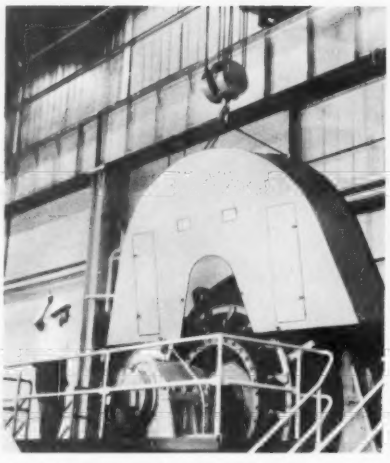
BUILT TO DRIVE HEAVIER LOADS—accelerate, start, stop and reverse faster—MD-600 motors meet toughest demands of automated systems. Integral feet on the endshields allow the armature to stand alone when removed from frame.

*Three Reasons General Electric D-c Drives are Best for*

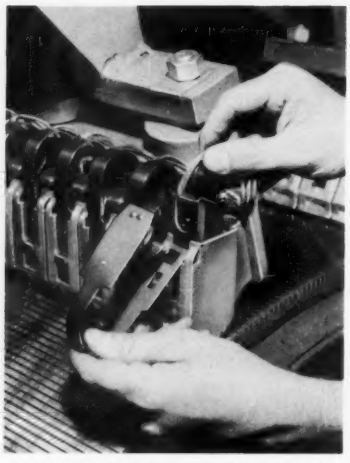


# 3. G-E Drives Give You New Competitive

D-c Main & Aux. Drives

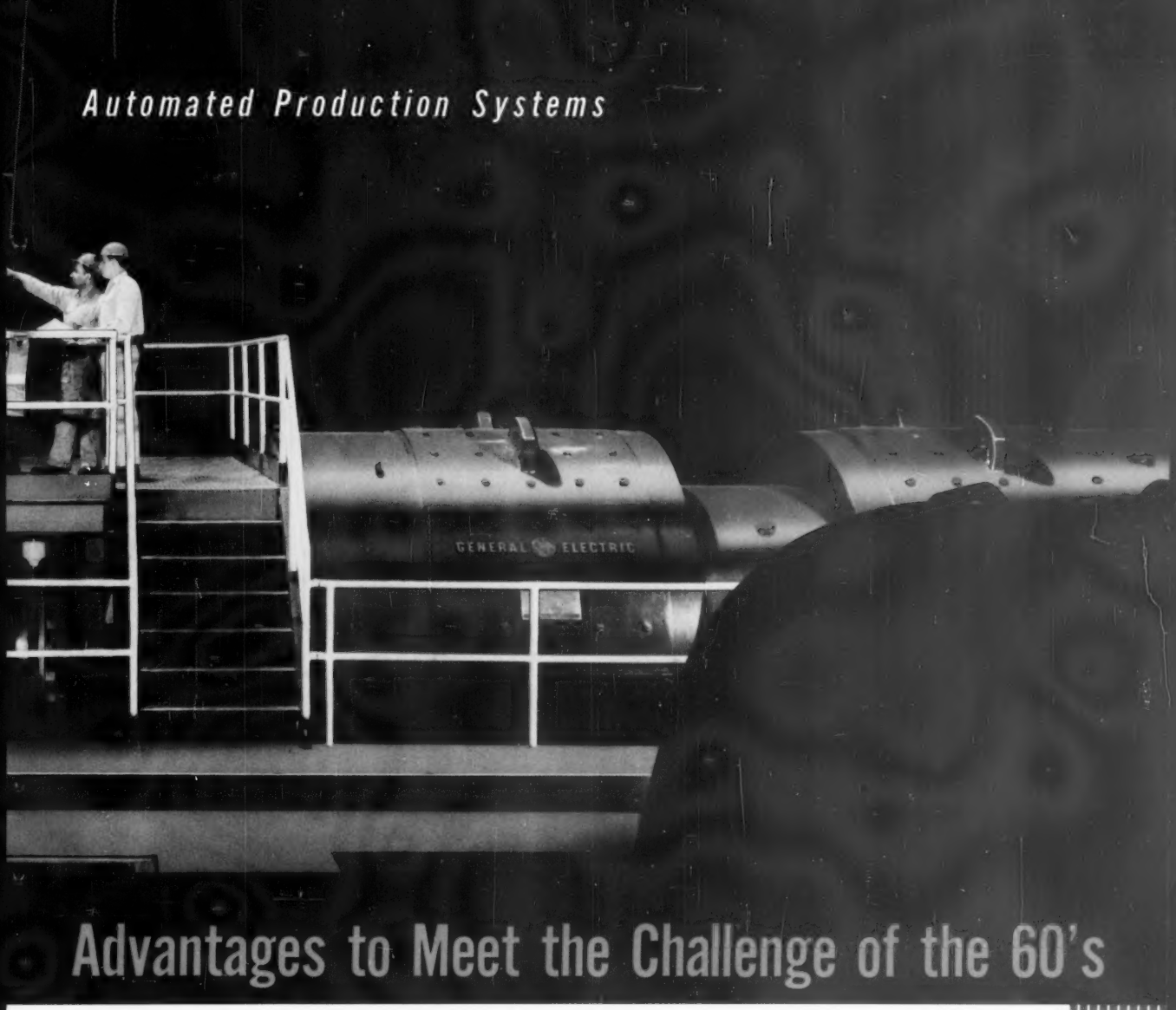


**NEW QUICK-REMOVABLE COVERS** use no bolts, permit easy access. Tapered guide pins, attached to "TOP-FORWARD" d-c main drive motor frame, accurately position covers on base and frame. Removal and replacement time is reduced to a minimum.



**CONSTANT-PRESSURE BRUSH-HOLDERS** eliminate all pressure adjustments, give optimum contact at all times. General Electric brush-holder design permits observation of brush wear. Brush can be replaced in seconds.

**DISC-LUBRICATED BEARINGS** provide positive oiling during all operating conditions. Self-aligning, cast-steel, babbitt-lined bearings can be removed without disconnecting oil piping—maintenance is simplified.




# Advantages to Meet the Challenge of the 60's

Higher processing speeds, tighter production schedules and better product quality are requisites of industrial growth in the coming decade. As continuous processing and automation techniques spread throughout industry, rapid maintenance of basic equipment becomes an increasingly important competitive advantage.

General Electric's simplified-maintenance drive design gives you this advantage plus the high thermal and mechanical limits and improved commutation demanded of automated processes.

Let your G-E Sales Engineer show you how easily new d-c main and auxiliary drives can fit into your modernization plans, improve operating efficiency and help you meet the challenge of the '60's. For descriptive information on d-c motors for heavy industry, write Section 772-9, General Electric Co., Schenectady 5, N. Y. *Large Motor & Generator Dept., Schenectady, N. Y./Direct Current Motor & Generator Dept., Erie, Pennsylvania.*

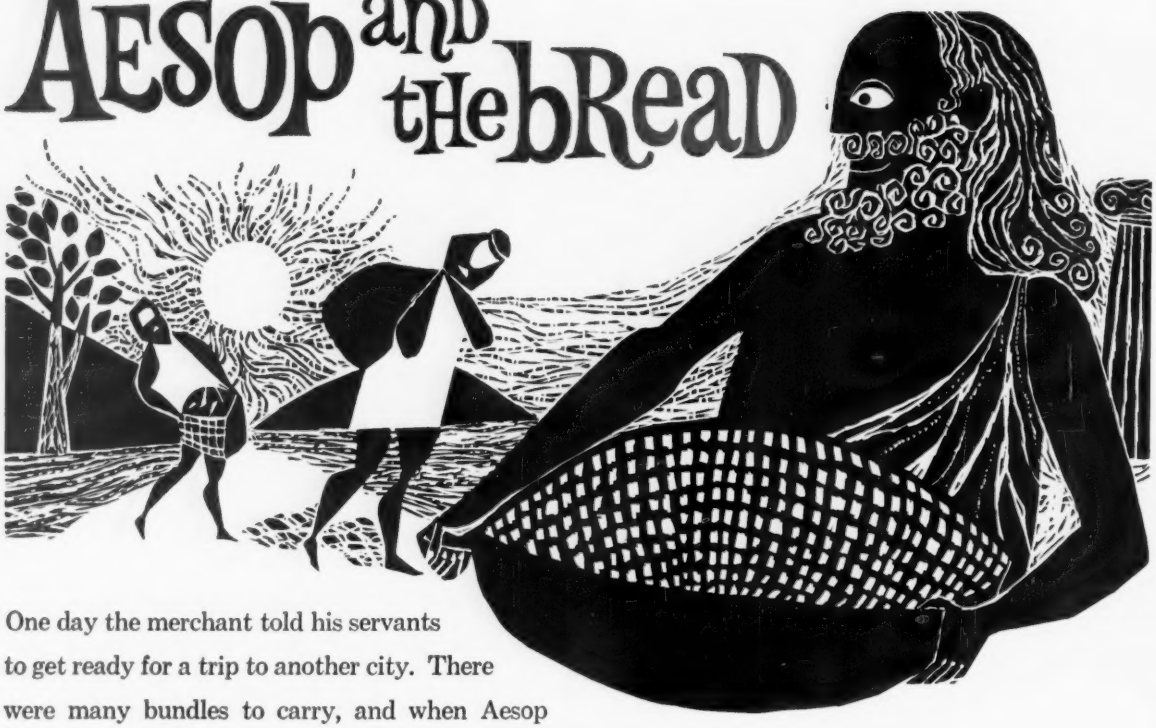
*Progress Is Our Most Important Product*

GENERAL ELECTRIC

D-c Main & Aux. Drives

cleverness wins

# AESOP and the bREAD



One day the merchant told his servants to get ready for a trip to another city. There were many bundles to carry, and when Aesop saw them all he said to his fellow servants, "If you let me carry the lightest bundle, I'll tell you many fine stories as we walk." The servants agreed because they liked Aesop's stories. But when Aesop picked up the heaviest bundle of all—a large basket of bread — the other servants laughed at him. He barely could manage to carry it. Around noon, the travelers stopped to rest and eat their dinner. Aesop gave each servant a loaf of bread for dinner, so the big basket wasn't as heavy during the afternoon. When the sun went down, Aesop gave each servant a loaf of bread for supper, and the big basket was empty. The next day the merchant and his servants went on to the city. Aesop had nothing to carry but his empty basket, so he told stories to the other servants while they struggled under their loads.

## moral: Alert analysis wins out in the end.

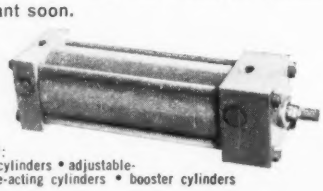
Have you analyzed your machines to make sure that proper cylinder designs are providing most efficient production? Ask your Hydro-Line representative to help you. Of course, he might try to sell you a Hydro-Line cylinder or two, but only if you really need them. And his analysis now may save you considerable time and money later.

Your Hydro-Line representative will recommend standard stock cylinders if he can . . . they have all catalog stock dimensions, cost you less, and can be delivered immediately. If a stock cylinder is unsuitable for your application, he'll recommend the proper modified standard cylinder, which has its own stroke or other deviations from catalog stock dimensions. Either way, you can be sure that the best cylinder design is working to help you gain more production and earn more profits.

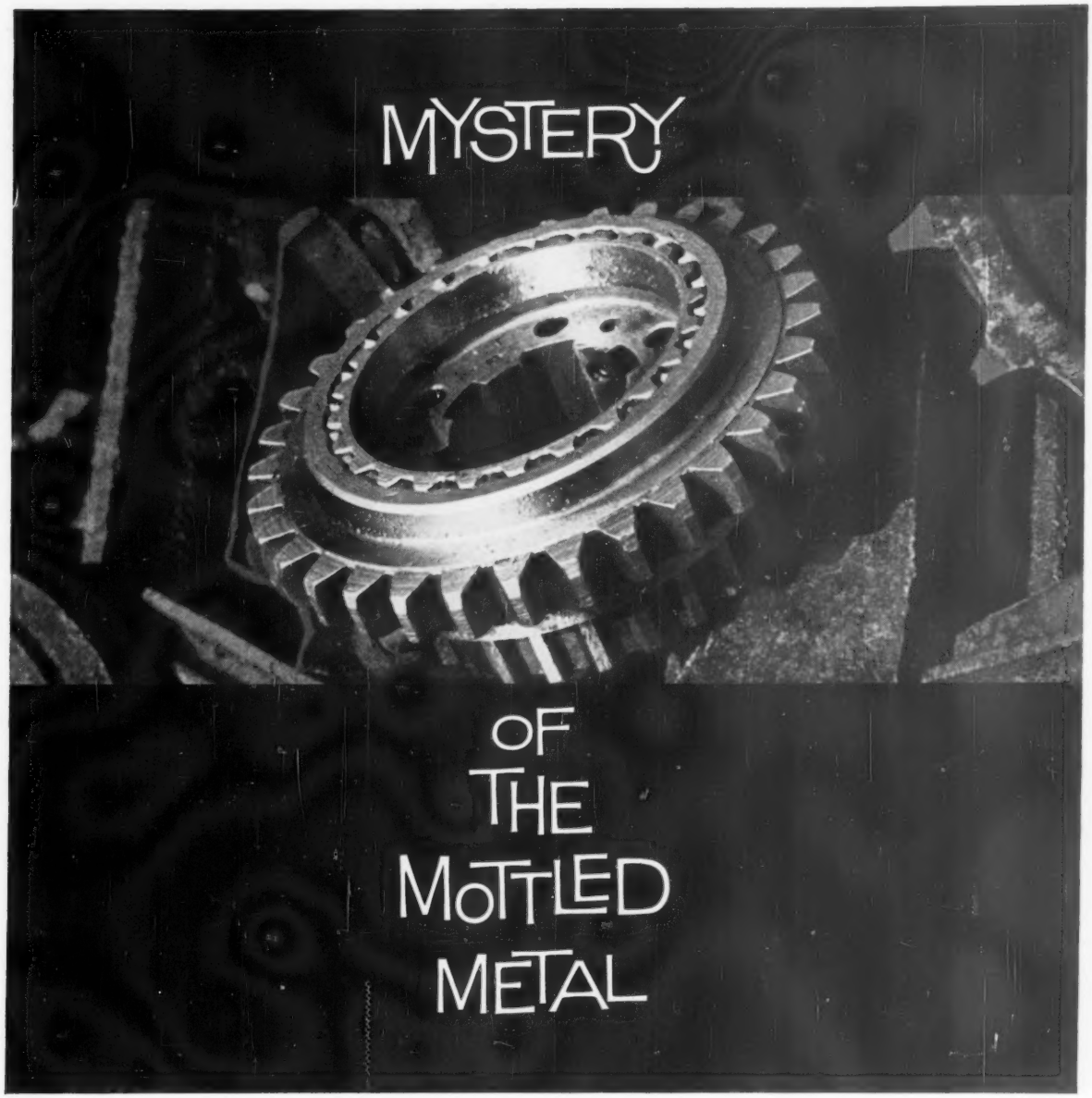
Look in *Sweet's Product Design File* (Bulletin 8a-Hy) for standard dimensions of stock cylinders and the address of your nearest Hydro-Line representative. Ask him to analyze cylinder requirements in *your* plant soon.

HYDRO-LINE

**HYDRO-LINE CYLINDERS**



5600 PIKE ROAD • ROCKFORD, ILLINOIS manufacturers of:
high- and low-pressure hydraulic cylinders • heavy-duty air cylinders • adjustable-stroke cylinders • dispensing cylinders • intensifiers • single-acting cylinders • booster cylinders




## OR HOW TO DEGREASE MORE PARTS PER DOLLAR OF CLEANING COST

X marks the spot where this company's vapor-degreasing troubles began to pile up. Parts coming out of the degreaser should have been shiny, bright. But they weren't.

Clue: There was a fatal weakness in the solvent. It was stabilized—but it didn't have the staying power to take rack after rack of parts loaded with acid cutting oil. Few solvents do.

**PSP TO THE RESCUE** Now this company buys a degreasing solvent that does not wear out prematurely. A solvent that can't "go sour" without notice and start staining parts instead of cleaning them. A solvent that cuts degreasing cost, because it lengthens the time between degreaser cleanouts by weeks or even months.

You can get this degreasing solvent, too. Just ask for Nialk TRICHLOR. You don't have to worry about its stability. You don't have to add fresh stabilizer. Even the vapor in the bath is stabilized. And you use less of this solvent, because less goes down the drain in needless cleanouts.

For more facts on what you can save with this better, more stable trichlorethylene, give your Nialk TRICHLOR distributor a call. Today.

**NEW 36-PAGE BULLETIN** explains fully how you get more and better vapor degreasing for the money with Nialk TRICHLOR. Shows basic types of vapor degreasers. Discusses cycles, operating procedures, stabilizers, causes of solvent contamination, solvent recovery, trouble shooting. Ask your distributor for a copy or write us.

Nialk® Trichlor, a product of

**HOOKER CHEMICAL CORPORATION**

1209 Union Street, Niagara Falls, New York

*Sales Offices:* Buffalo Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
*In Canada:* Hooker Chemicals Limited, North Vancouver, B. C.

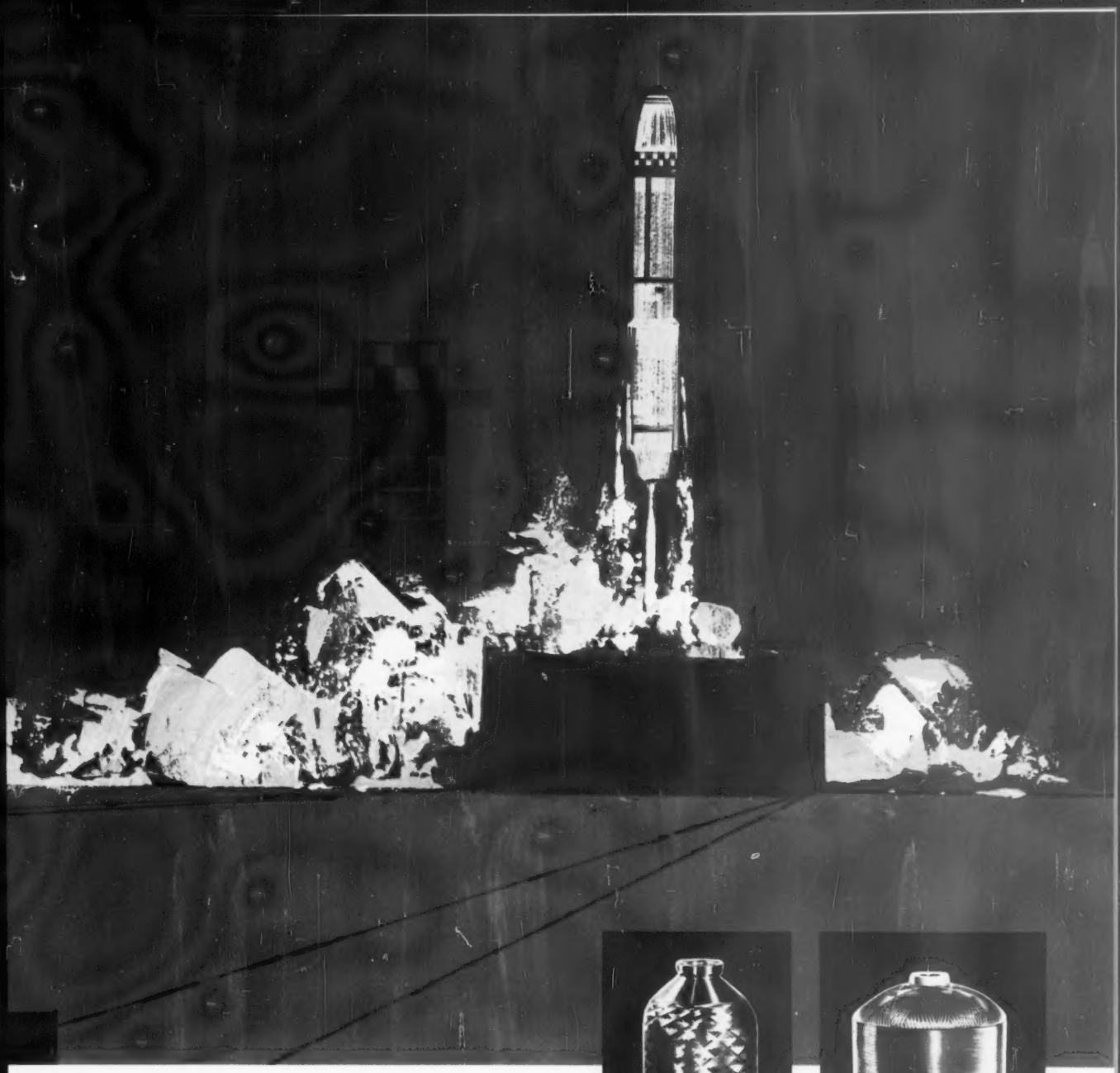
HOOKER CHEMICALS PLASTICS

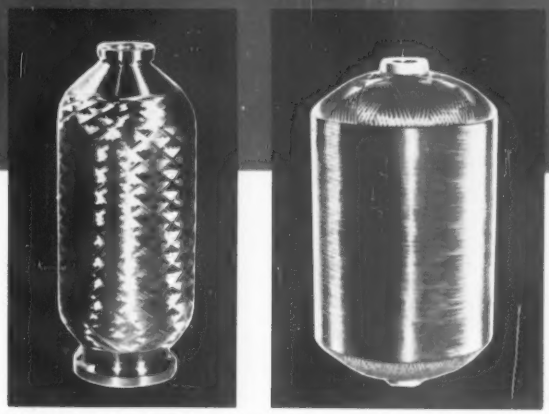
# NS SPECIAL WIRE (575,000 psi) WRAPS

In the development of solid-fuel rocket cases, a leading manufacturer fabricated and experimented with welded steel and glass fibers, as well as many steel wire specimens, to find a fuel case material with the most favorable strength-to-weight ratio for fuel case applications.

EARLY DEVELOPMENT STAGES—At the outset of their testing program, the rocket manufacturer asked National-Standard to develop .004″ wire with 575,000 psi, the ultimate tensile strength required of steel wire to provide the strength-to-weight ratio needed. The wire was to be made into tapes of uniformly-stressed wires, coated with epoxy resin to separate the wires, and wound over collapsible mandrels to form the fuel case.

NATIONAL-STANDARD ENGINEERS produced .004″ high-carbon steel wire that met every specification, after intensive testing with many types of wire and finishes. Special wire developed by NS met rigid size tolerances, residual twist and controlled cast requirements.





**WIRE-WRAPPED ROCKET CASES** are wound over collapsible mandrels using a number of strands of very high strength, small diameter wire formed into tapes.

# ROCKET FUEL CASES

The end result of NS—customer cooperation was the ability to produce wire-wrapped rocket cases with very high hoop stress and lower cost than those being produced by other methods. And the fuel case manufacturer is able to provide maximum case-to-case reliability.

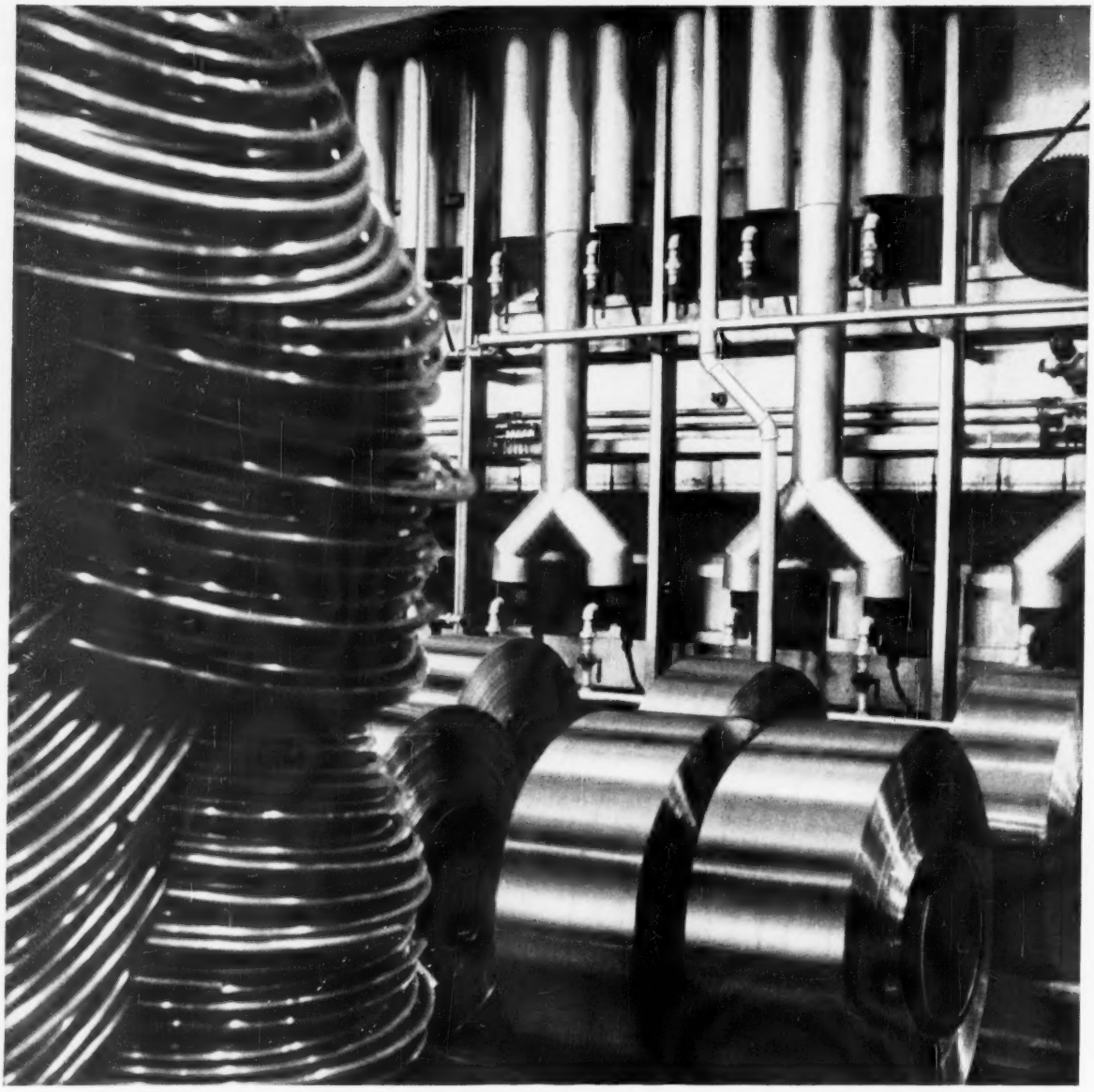
EXPERIENCED ENGINEERING HELP of this kind is available to you from National-Standard to meet special or unique high-quality wire applications. Write for additional information to National-Standard Company, Niles, Michigan.

NS NATIONAL-STANDARD COMPANY

*Manufacturer of Specialty Wire and Metal Products*

**NATIONAL-STANDARD COMPANY**

***Niles, Michigan***

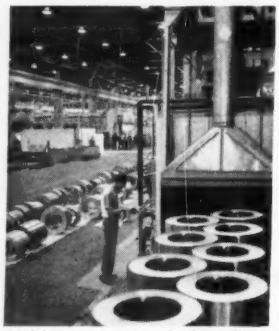


## American Brass relies on GAS for precise control in heat processing

Five huge gas-fired furnaces handle heat processing at the new American Brass Company plant near Los Angeles—largest copper and brass mill in the West.

Gas heat anneals their copper and brass coils, tubing and strip . . . processes copper billets for extrusion and for piercing . . . and bright-finish anneals copper coils and tubing.

Why the choice of gas heat? Precise temperature control! Gas heat develops the required temperatures rapidly. Maintains them precisely. Adapts most easily to automatic temperature control. Offers unbeatable fuel economy.

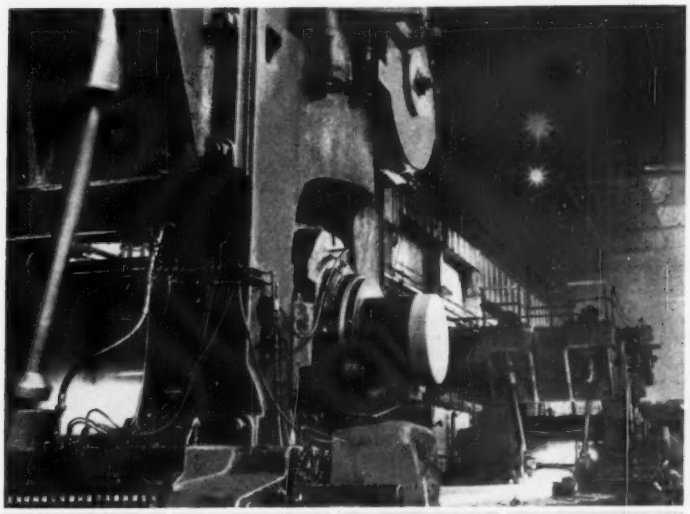


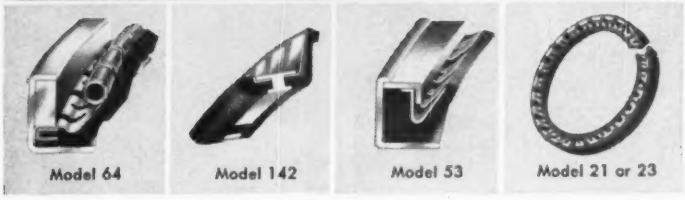
*Multi-purpose, gas-fired, radiant tube, forced circulation roller hearth furnace at American Brass Company's new Los Angeles mill. Used in the bright finish annealing of copper coils, tubing and strip.*

American Brass, and thousands of other companies, can tell you *gas* is technically right and economically sound for all types of heat processing. Call the Industrial Sales Engineer at your local gas company. *American Gas Association.*

**FOR HEAT PROCESSING GAS IS GOOD BUSINESS!**

## ENGINEERED OIL SEALS for Steel Mills






## FULL BEARING PROTECTION IN SEVEREST ATMOSPHERES

**Everywhere in steel**—on hot and cold strip mills, blooming and structural mills—Garlock KLOZURE* Oil Seals prevent leakage of vital bearing lubrication. And they further prevent damage to the bearings by sealing out scale, spray, dirt, and other foreign matter.

**For example,** Model 142, a face-type KLOZURE, is designed to seal surfaces perpendicular to shaft . . . keeps water splash and scale out of bearings at the shoulder of mill rolls. Models 64 and 82 are applied to large shafts at normal or high speeds . . . ideal for protecting bearings on back-up and work rolls. Model 53 withstands temperatures up to 250°F at normal or high speeds . . . recommended for table rolls. Where equipment can't be dismantled easily, Models 21 or 23 Split-KLOZURES are the choice.

**All KLOZURES** are oil and grease resistant . . . impervious to water, mild acids, alkalies . . . non-abrasive . . . withstand temperatures from −40°F to +250°F. For extreme conditions, Garlock furnishes sealing elements resistant to practically any fluid, and serviceable as high as +500°F.

**Sealing Element,** case, spring, and adapter on KLOZURES are designed for peak efficiency and durability. Garlock, with 70 years' experience and modern production facilities, manufactures KLOZURE Oil Seals in proper design and to extremely accurate dimensions from materials which are best suited for your application. Engineering skill, vast experience, and mass production know-how bring you the finest oil and grease seals available.

**Obtain more information** by calling the nearest of Garlock's 26 sales offices and warehouses throughout the U.S. and Canada. Or, write for KLOZURE Catalog 30. Garlock Inc., Palmyra, N.Y.

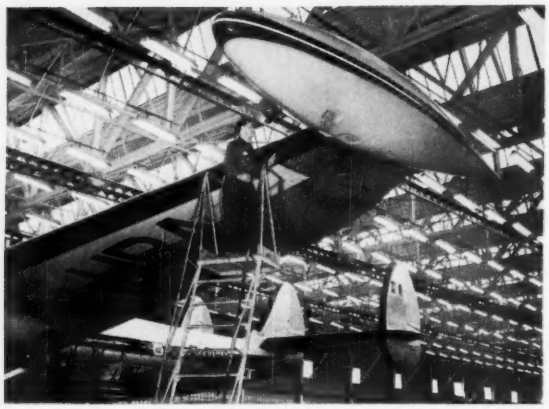
# GARLOCK

**Canadian Div.:** Garlock of Canada Ltd.

**Plastics Div.:** United States Gasket Company

**Order from the Garlock 2,000** . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

*Registered trademark



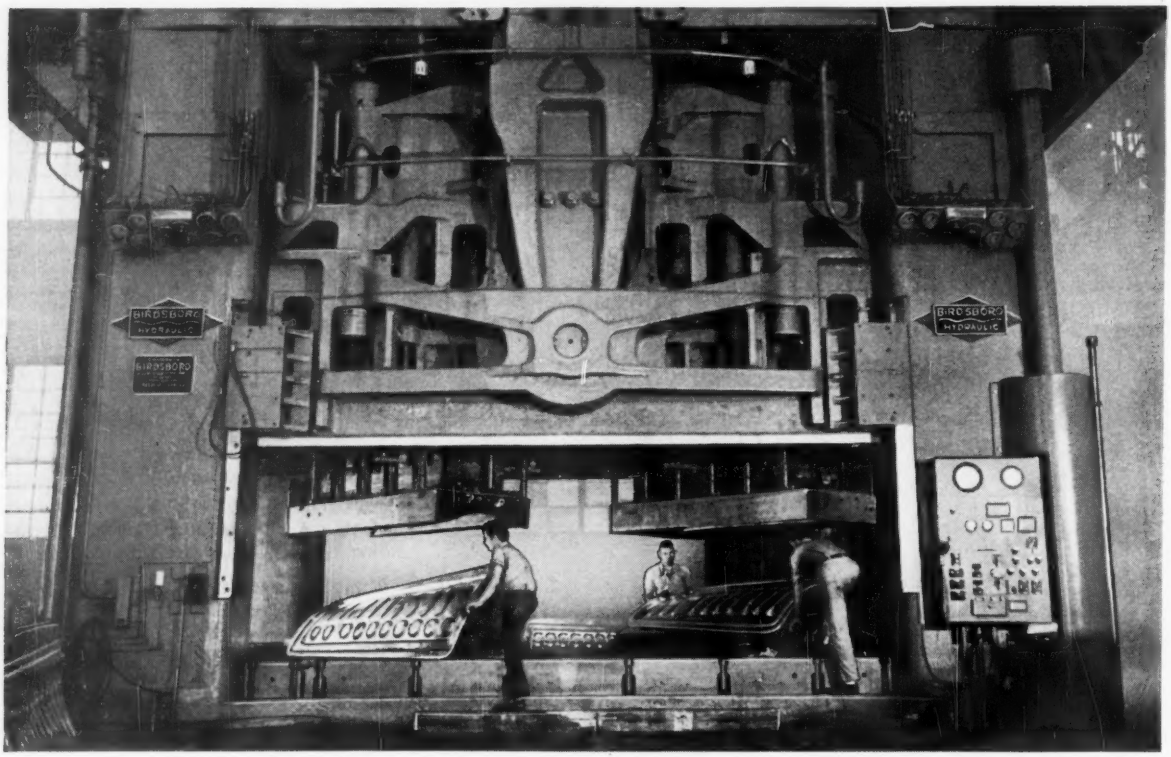
## **BIRDSBORO** *Presses . . .*

### *designed to meet changing method, material, market and cost problems*

• Birdsboro is gearing its press designs in the same way you are gearing your entire business . . . for both present *and* the future.

Changes in markets, methods, materials and costs are pushing the "future" closer and closer to today. To help you meet these problems, Birdsboro presses are versatile and rugged enough to fit into your production future as well as the present.

Advanced design, triggered by imagineering, provides you with longer usable life in each press. Ask your Birdsboro representative about specific examples. *Sales Department:* Reading, Pa., *Engineering Department and Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

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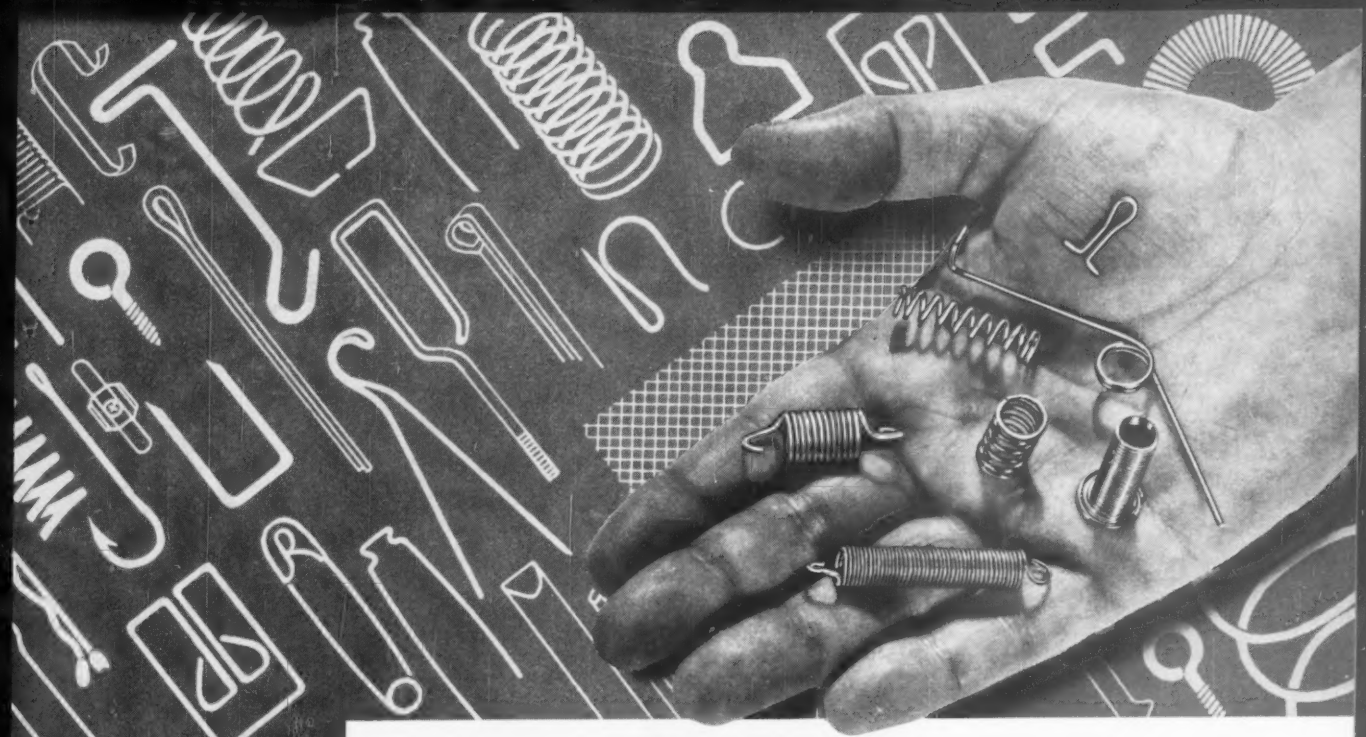
BIRDSBORO HYDRAULIC

# BIRDSBORO CORPORATION

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL



# PAGE SPECIAL HB
# Can Cut Wire Costs Up to 60%

You can use PAGE *Special* HB for many jobs where music wire has always been specified—and save up to 60% on your wire costs! Tensile strengths of *Special* HB, which is available in the size range .020" diameter to .162" diameter (bright finish and galvanized), approach those of music wire in all sizes—and in sizes .090" diameter and coarser equals them! Here are some typical examples:

| SIZE | STANDARD HB | *SPECIAL* HB | MUSIC WIRE |
|---|---|---|---|
| .1620 | 219,000 min. | **249,000 min.** | 249,000 min. |
| .1350 | 227,000 " | **258,000 "** | 258,000 " |
| .0800 | 244,000 " | **276,000 "** | 282,000 " |
| .0200 | 310,000 " | **320,000 "** | 350,000 " |

If you now use music wire, or have been prevented from using it because of its high cost, it makes sense to investigate PAGE *Special* HB.

***WHATEVER*** your wire requirements, you can count on PAGE quality from America's leading special-purpose wire mill. PAGE will give you the tensile strength, ductility, finish, tolerance and other properties you require in a wide range of manufacturers wire items — including corrosion-resistant ACCO *Aluminized* Wire and wires of special shapes.

***Write for details.*** Write us at Monessen, Pa., for Booklet **DH-107a** for the story on PAGE *Special* HB—or for information on other wires.

ACCO

## PAGE MANUFACTURERS WIRE

**Page Steel and Wire Division • American Chain & Cable Company, Inc.**

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

# PAGE — *the source for answers to wire problems*

# Destination Philadelphia October 17

"The rate of advance of metal science is now so rapid that it is quite difficult to stay abreast of current knowledge even in our special fields. Attending the ASM Metal Shows is a most pleasant and effective means of exposing ourselves to the latest technical thought and developments."

**C. K. Donoho,**
**Chief Metallurgist**
**AMERICAN CAST IRON PIPE COMPANY**

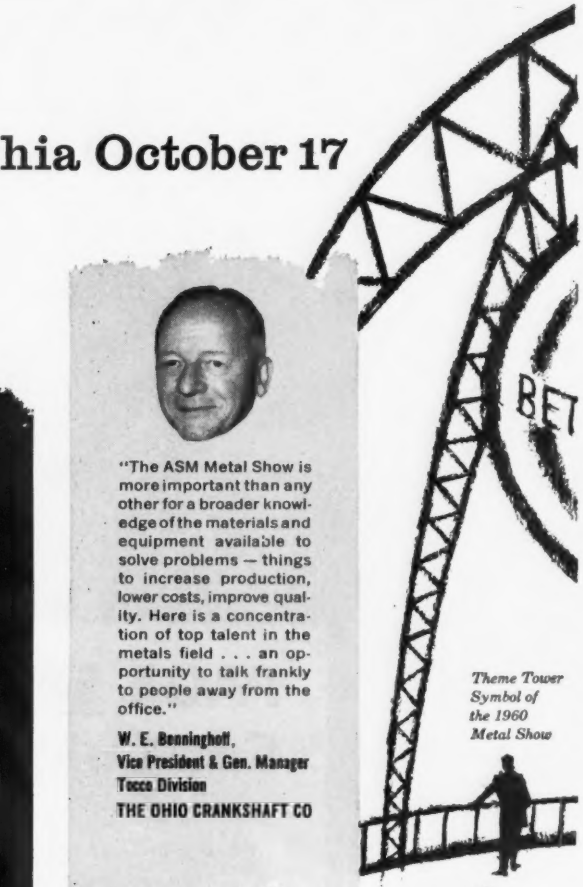
"Because the accent of the 1960 Metal Show is being placed on metals, their production engineering properties, fabrication and finishing, I expect to find information on all the newest materials, manufacturing processes and related equipment. I also expect to renew acquaintance with many of my metallurgical friends and make new ones."

**Dr. Ralph W. E. Leiter,**
**Director of Laboratories**
**THE BUDD COMPANY**



"The ASM Metal Show is more important than any other for a broader knowledge of the materials and equipment available to solve problems — things to increase production, lower costs, improve quality. Here is a concentration of top talent in the metals field . . . an opportunity to talk frankly to people away from the office."

**W. E. Benninghoff,**
**Vice President & Gen. Manager**
**Tocco Division**
**THE OHIO CRANKSHAFT CO**




*Theme Tower Symbol of the 1960 Metal Show*

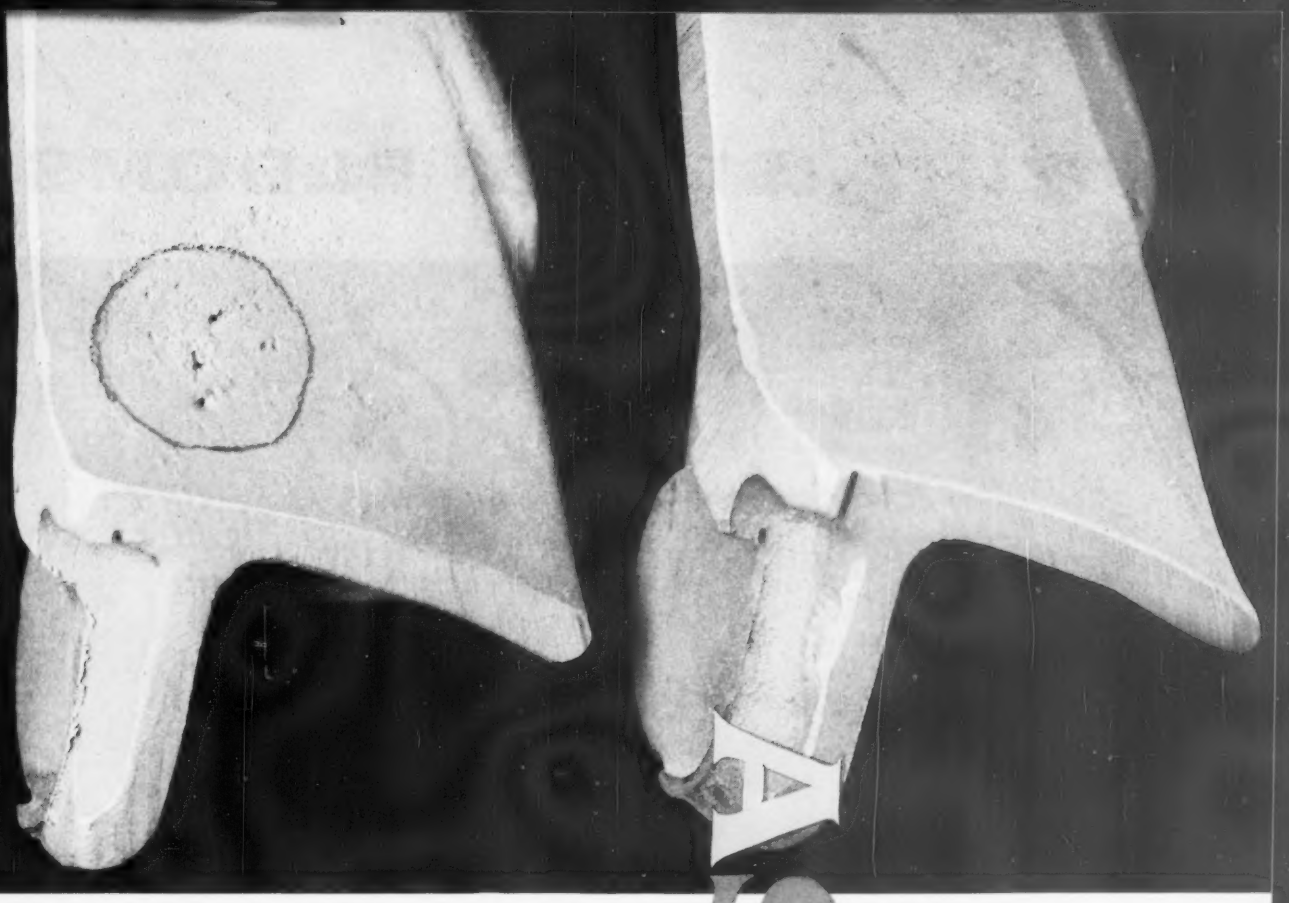
Crossroads of metals and materials technology — the 1960 Philadelphia Metal Show! Here's your opportunity to see, hear, learn and profit . . . to increase your capability in the world of metals. This year, a new emphasis on metals and materials, processes and techniques will create a Metal Show that's truly exciting and different. You can see 300 exhibits and hear 250 technical papers. Urge your friends to go — ACT NOW TO ATTEND!

## NATIONAL METAL CONGRESS and EXPOSITION

**Philadelphia Trade & Convention Center • October 17-21**

*Sponsored by the* AMERICAN SOCIETY FOR METALS *Metals Park • Novelty, Ohio*

**Cooperating Activities: The Metallurgical Society of AIME; Society for Non-destructive Testing, Inc. Associations presenting technical sessions in cooperation with ASM: Metal Powder Industries Federation; Metal Treating Institute; Ultrasonic Manufacturers' Association; Industrial Heating Equipment Association; Special Libraries Association—Metals Division; American Society for Testing Materials—Committee B-9; and extensive research and engineering programs of the American Society for Metals, and ASM Seminars.**



*Now ASARCO process reduces and controls shrinkage*

## FEDERATED PT (pressure-tight) ALUMINUM CASTING ALLOYS

Use PT-processed metal instead of any of the standard sand and permanent mold aluminum casting alloys. Result: no unpredictable shrinkage. No need for extra gates and risers. Higher yield per pound of metal. More uniform pressure-tight castings. A brighter cleaner surface. All the same physical and mechanical properties and characteristics. Write or call today for full information about PT grade aluminum, to Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, RE 2-9500; or call your nearest Federated sales office.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

Comparative photograph illustrates the effect of PT treatment. Casting on left from standard aluminum alloy, shows typical shrinkage over a large area. Compare with casting on right, cast in PT grade, under the same conditions! Alloy: F460 (319)

**FEDERATED METALS DIVISION**

*Where to call for information:*

ALTON, ILLINOIS
Alton: Howard 5-2511
St. Louis: Jackson 4-4040

BALTIMORE, MARYLAND
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BIRMINGHAM, ALA.
Fairfax 2-1802

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CHICAGO, ILL. (WHITING)
Chicago: Essex 5-5000
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MILWAUKEE 10, WIS.
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New York: Digby 4-9460

PHILADELPHIA 3, PENNA
Locust 7-5129

PITTSBURGH 24, PENNA.
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PORTLAND 9, OREGON
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ROCHESTER 4, NEW YORK
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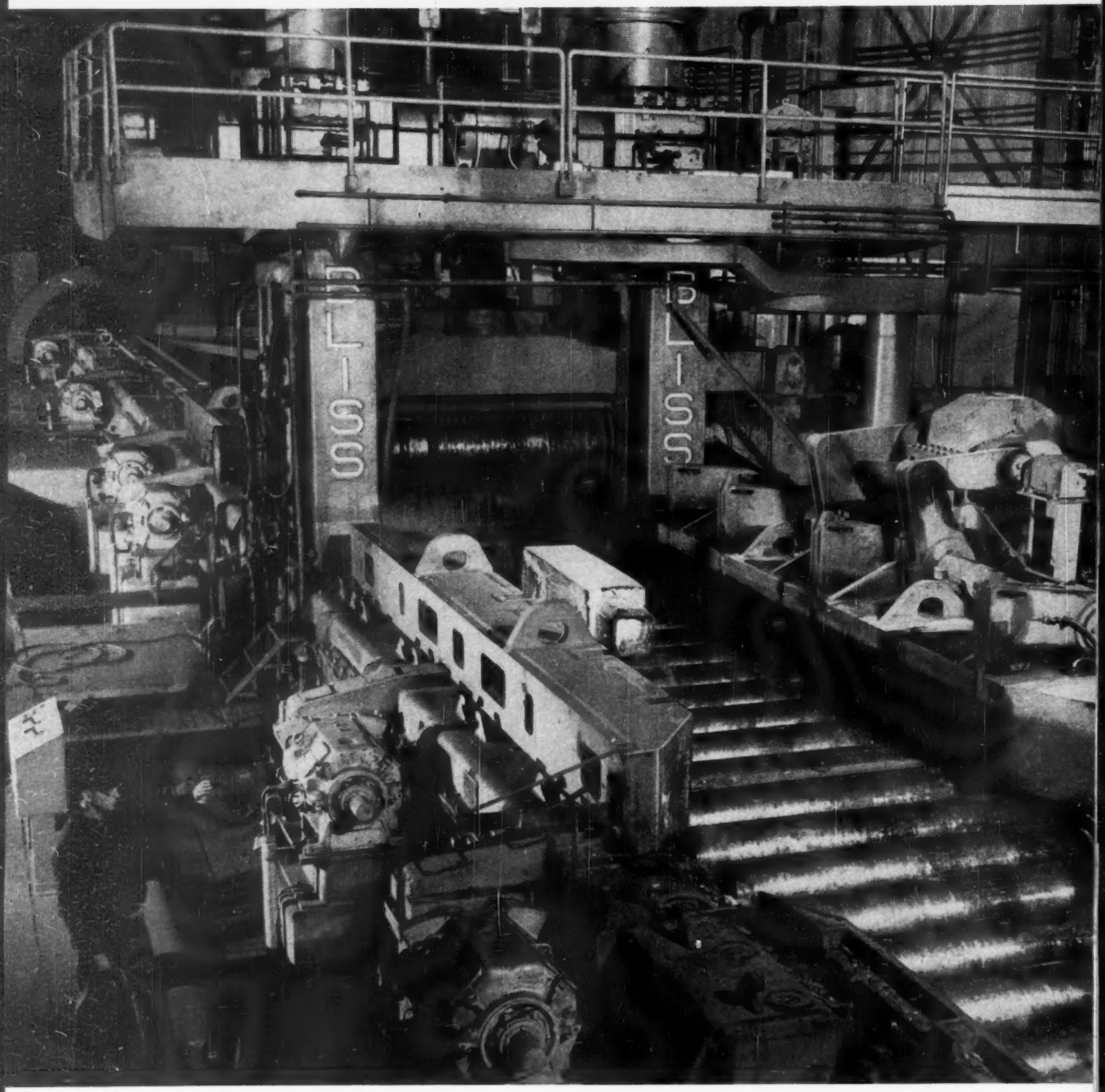
IN CANADA: Federated Metals Canada, Ltd.
Toronto, Ont., 1110 Birchmount Rd., Scarborough, Phone: Plymouth 73246

Montreal, P.Q., 1400 Norman St., Lachine, Phone: Melrose 7-3591

# SLABS, BLOOMS




Hot ingot heads into first pass through new Bliss mill.

# AND ROUNDS ON THIS VERSATILE MILL

## *Quick handling of 7 1/2-ton ingots another dividend*

"Big investment, big dividends" sums up the new automated blooming mill illustrated at left. Key component of a new $14 million steel plant, it was built and designed by Bliss' Rolling Mill Division to enable its owner, a prominent manufacturer of heavy equipment, to meet mounting orders for seamless tubing and welding fittings.

Here is automation at its smoothest. With only a handful of men in efficient control pulpits, the plant can turn out blooms of many shapes and sizes; can handle ingots as heavy as 7½ tons!

Heart of the operation is a new, 40″ x 90″ high-lift blooming mill, whose rolls are automatically set for each pass by punched cards. Taking the ingots poured by the new 100-ton electric furnace, it rolls them into the size required.

Of special interest is the mill's unusually versatile design. Thanks to it, the plant is able to handle round shapes as well as blooms and slabs, simply by changing the rolls. The latter were supplied by Bliss' Mackintosh - Hemphill Division.

According to the plant superintendent, this new plant has increased the company's melting and rolling capacity a full 50%. And based on its proven operating performance, the new Bliss mill will be ready to take any additional new load in stride.

Whether your plans call for a big outlay or a modest one, it will pay you to discuss them with Bliss. To learn how other firms have . . . and have profited . . . write for our 84-page Rolling Mill Brochure, Bulletin 40-B.

BLISS
SINCE 1857 ®

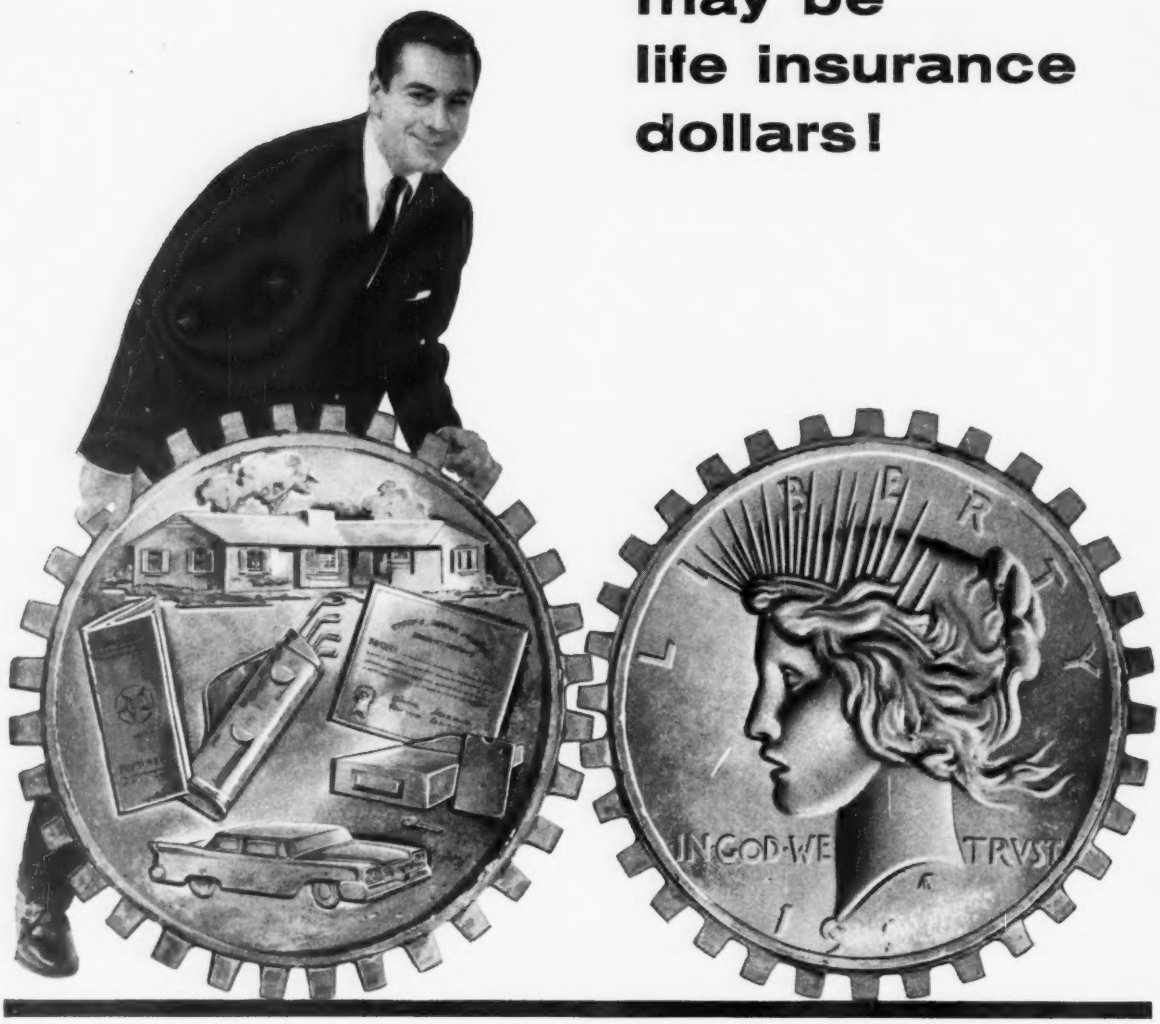
*Bliss is more than a name . . . it's a guarantee*

**E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio**

Rolling Mills • Mill Auxiliaries • Amerigear / Bliss Spindles

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio

# Your most effective dollars may be life insurance dollars!




Chances are the dollars you are now putting into life insurance can be stretched further with no increase in cost to you!

The Ætna Life Estate Control Plan coordinates your life insurance with *all* the assets that go into your estate. Then it develops the plan that uses everything to maximum advantage. You'll find your life insurance dollars are more effective dollars.

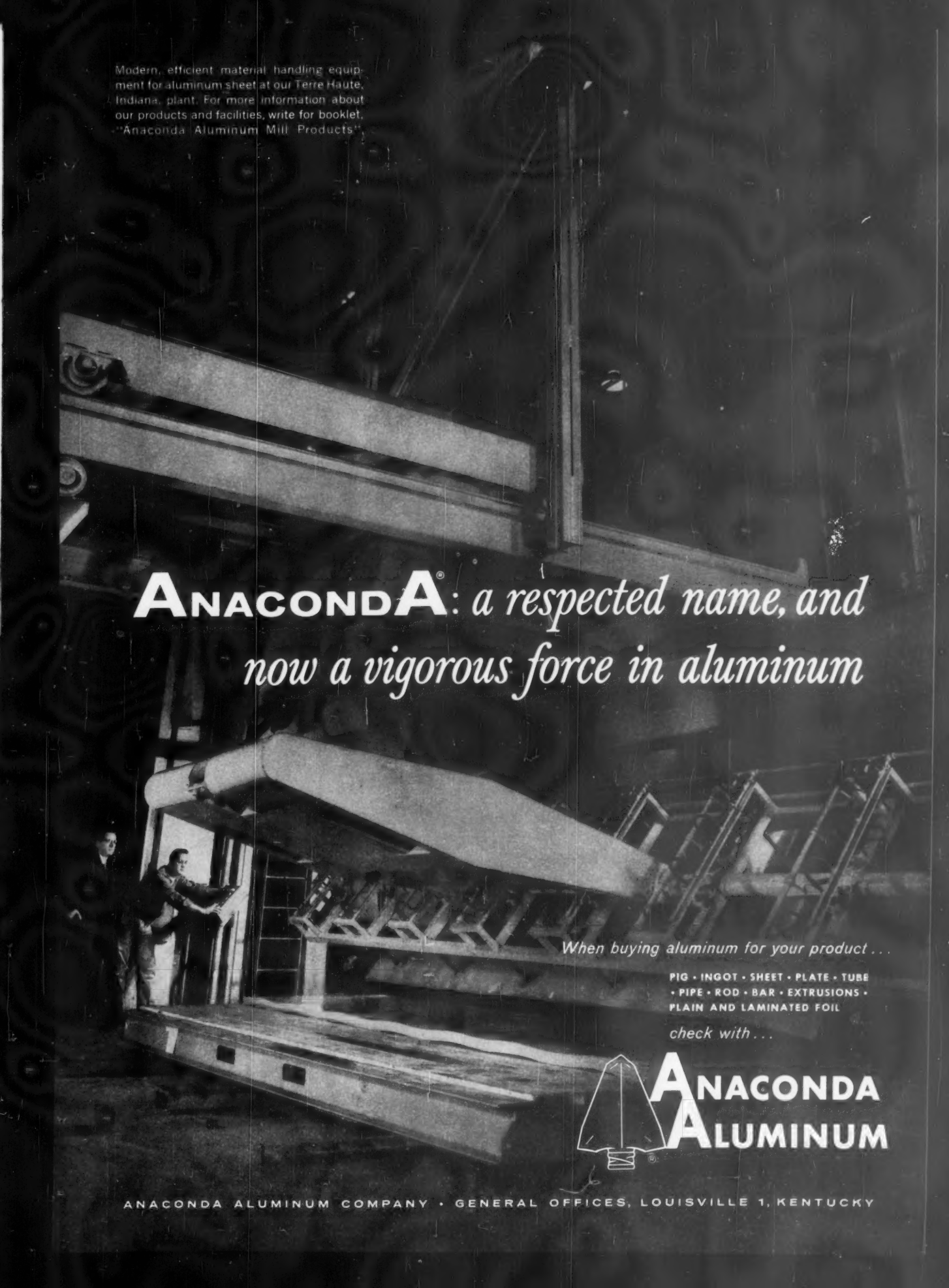
The Estate Control Plan is exclusive with Ætna Life, a pioneer in family programming. It is available to you through your local Ætna Life representative.

**Ætna Life's Estate Control Plan works for you!**

- **Assures maximum effectiveness from your present life insurance**
- **Coordinates all your assets**
- **Balances need with income**
- **Gives you complete private record**

ÆTNA LIFE
INSURANCE COMPANY
**Hartford 15, Connecticut**

*Affiliates:* Ætna Casualty and Surety Company
Standard Fire Insurance Company



Modern, efficient material handling equipment for aluminum sheet at our Terre Haute, Indiana, plant. For more information about our products and facilities, write for booklet, "Anaconda Aluminum Mill Products".

# ANACONDA®: *a respected name, and now a vigorous force in aluminum*

*When buying aluminum for your product . . .*

**PIG • INGOT • SHEET • PLATE • TUBE • PIPE • ROD • BAR • EXTRUSIONS • PLAIN AND LAMINATED FOIL**

*check with . . .*

**ANACONDA ALUMINUM**

ANACONDA ALUMINUM COMPANY • GENERAL OFFICES, LOUISVILLE 1, KENTUCKY

**ROLLWAY MAXIMUM BEARINGS**

. . . . . What's the limit: Heat? Shock? Speed? Or complicated radial and thrust loads?

Name the combination of requirements . . . and chances are you'll find them met by a Rollway Maximum precision radial cylindrical roller bearing. If not, then Rollway engineers will modify any factor to meet your application.

Rollers are crowned to prevent end-loading and the resultant spalling of races. Directional trueness is maintained by retainers of standard bronze or "Rollube" ferrous alloy of one piece or two piece construction.

You may wish to refer to the Rollway Catalog and Engineering Data Book when writing specifications for a high precision bearing. It contains the first listing, by any manufacturer, of the thrust capacities of cylindrical radial roller bearings. Send for it today.

**ENGINEERING OFFICES:**

**Syracuse Boston Chicago Detroit**
**Toronto Pittsburgh Cleveland**
**Seattle Houston Philadelphia**
**Los Angeles San Francisco**

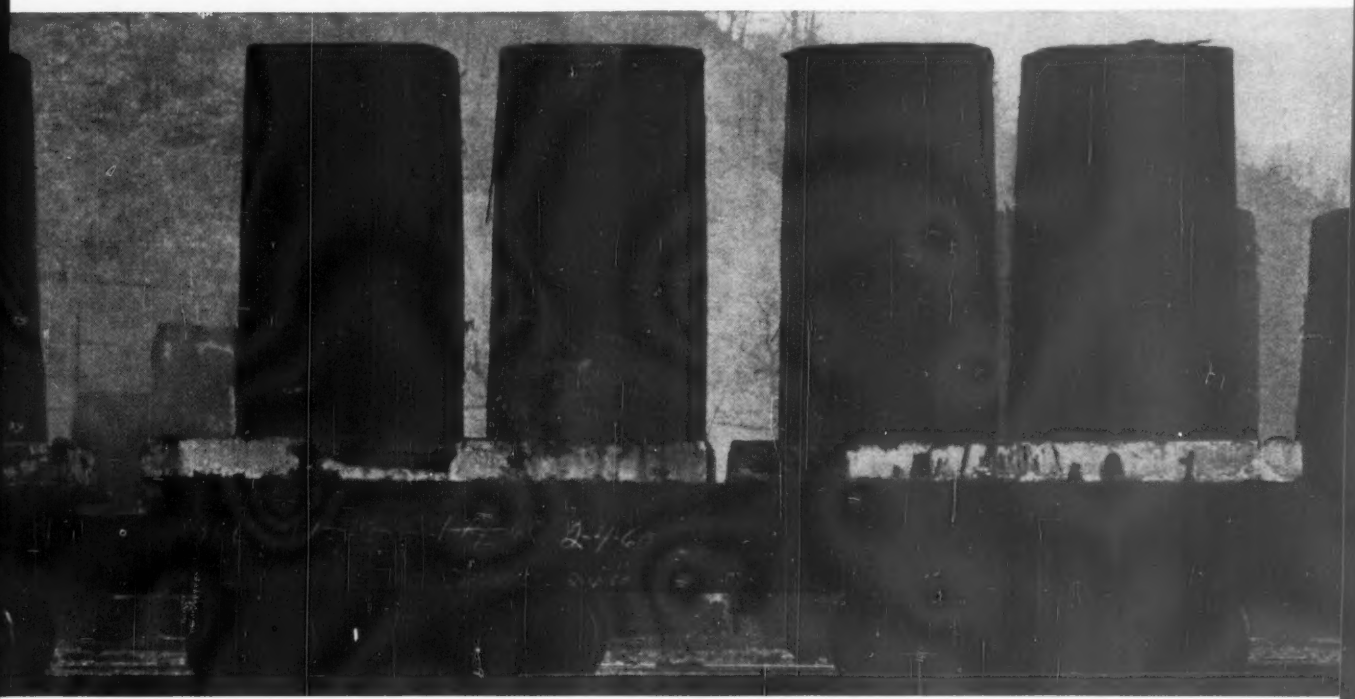
**ROLLWAY®**
**BEARINGS**
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

# Are you satisfied with your ingot car maintenance costs?

This mark tells you a product is made of modern, dependable Steel.

These rugged 8-wheel Ingot Mold Cars haven't had one single repair job since they were bought *six years ago!* Yet they work like new. Each car is designed with an all-welded steel body that offers long life and dependable service. United States Steel has the facilities, the skilled engineers and the technical know-how to build *strong* industrial cars. You give us your specifications and requirements, and we'll design for you the finest industrial cars in the world. We would appreciate an opportunity to discuss this personally and in greater detail. To arrange a meeting write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. or any of our District Offices.

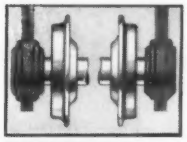
*USS is a registered trademark*



## Here's how USS Industrial Cars are built better:

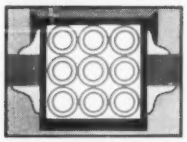
**ANTI-FRICTION OUTBOARD BEARINGS:**

High-capacity anti-friction bearings are located outside each of the car's eight wheels to minimize sidesway and to provide long, smooth-running performance.



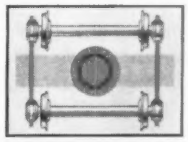
**SEVENTY-TWO COIL SPRINGS:**

Eighteen coil springs on each side of both trucks provide a total of 72 separate springs for a shock-absorbed level ride.



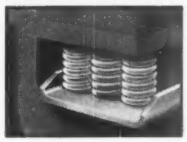
**HIGH ENGINEERING SAFETY FACTOR:**

Designed for a 200-ton normal capacity load —including ingots, molds and stools —each car has a substantial built-in safety factor to withstand maximum ingot-stripping thrusts.



**OVERSIZE CENTER PLATES:**

"Beefed-up" center plates between the trucks and car body are 18 inches in diameter—compared with the conventional 12 inches—to reduce the load per square inch on their surfaces.



**HOT-METAL SHIELDS:**

Curved end plates, long side skirts, and special drip shields protect the couplers, bearings and springs from runover molten metal and troublesome solidified drippings.

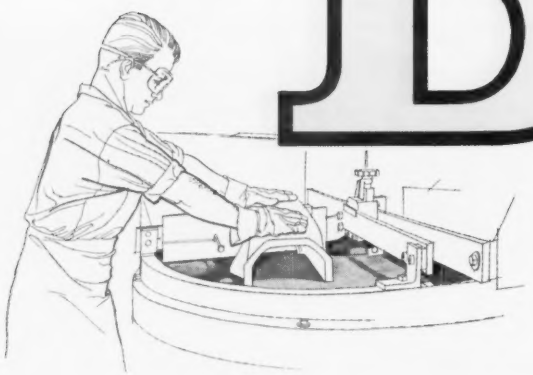
**United States Steel Corporation – Pittsburgh**
**Columbia-Geneva Steel – San Francisco**
**Tennessee Coal & Iron – Fairfield, Alabama**
**United States Steel Export Company**

**United States Steel**

# *Announcing:*

# A new high in disc grinding

*set by* **B14**



## *New Norton Resinoid Bonded DISCS*

**Under development and testing for years . . . now available as the finest wheels of their type ever made.**

*The latest news-making achievement in Norton product development is the B14 resinoid bond for disc wheels.*

It took several years to perfect this bond. It also took many months to complete nation-wide testing of the new B14 Discs, on all types of disc grinders — on jobs ranging from snagging to precision finishing, and on ferrous, non-ferrous and non-metallic materials. The tests were entirely comparative.

*Results of this across-the-board testing are outstanding. The new B14 Discs have proved beyond question their ability to grind more workpieces per Disc . . . faster and better, with fewer dressings . . . and with constant uniformity throughout extra long Disc life.*

Have your Norton Man, a trained Abrasive Engineer, study your requirements and make trial runs of the B14's you need — solid Discs or segmental, ALUNDUM* or CRYSTOLON* abrasive. Or get details from your Norton Distributor or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

**A few of many reports From Norton customers . . . PROVING B14 DISCS THE BEST**

JOB: Rough grinding iron castings, 3½″ x 2½″.

REPORT: **B14-37 CRYSTOLON wheel ground 6,000 parts with one dressing. Best previous Disc gave 4,500 parts with 4 dressings.**

JOB: Surfacing cold rolled steel washers on double disc machine.

REPORT: **B14-19 ALUNDUM Discs impressive as best so far, with very even wear.**

JOB: Double-disc grinding Alnico magnets.

REPORT: **B14 — mixed-abrasive wheel thoroughly approved for new orders.**

JOB: Rough grinding miscellaneous parts on double end machine.

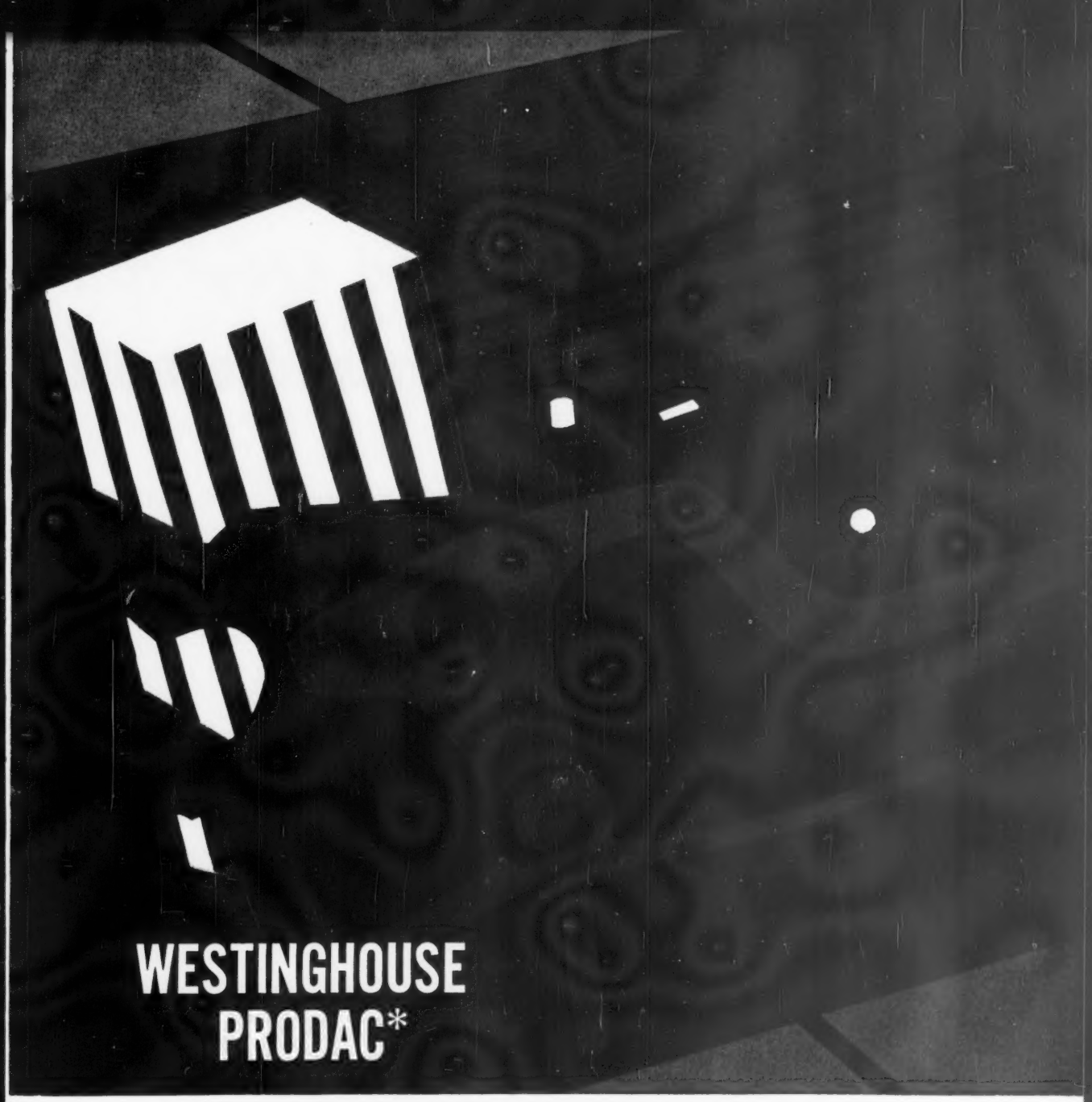
REPORT: **B14-44 ALUNDUM Discs performed better, lasted longer than all other types.**

NORTON ABRASIVES

W-1993

*75 years of . . .* Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes




# means automatic ingot buggy operation

. . . automatic cycling of ingot buggies and transfer cars . . . coordinated with sequencing of ingot buggy calls to the selected soaking pits . . . stopping accuracy of plus or minus one foot at the pits . . . no limit on number of stopping positions . . . remote control possible from any number of stations. This is but one of many ways Westinghouse PRODAC† is helping bring about the "mill of the future" today through completely automatic ingot buggy operations.

Westinghouse has service-proven PRODAC installations that economically automate slabbing mills, blooming mills, reversing roughers, stock house materials handling and many other mill applications.

By specifying Westinghouse PRODAC for your mill, you open the door to many new cost-saving benefits which are unobtainable with conventional controls. For example, PRODAC assures the most consistent standards of quality control at the highest rates of production speed . . . coordinates operation of all machines at the over-all maximum efficiency . . . holds maintenance to a minimum, and practically eliminates control failures . . . gives you a "building block" design which provides flexibility required for further mill automation.

The entire team of Westinghouse PRODAC engineers is at your service to help you determine exactly where and how PRODAC can benefit you. Your Westinghouse sales engineer can give you complete information, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-22113-B

*PROGRAMMED DIGITAL AUTOMATIC CONTROL
†Trade-Mark

Westinghouse

# New! Now Bethlehem forges every hardened steel roll from vacuum-degassed steel!

## Bethlehem vacuum-degassed steel minimizes the hazard of roll breakage.

Pint size, king size, every in-between size. Now Bethlehem forges *every* hardened steel roll from vacuum-degassed steel.

### PIONEER IN "VACUUM CASTING"

Bethlehem pioneered the development and use of vacuum-degassed ingots for highly stressed applications in the electric power, atomic energy, and other industries.

With our advanced steel-pouring techniques, we can pour molten steel from a furnace ladle to a secondary ladle within a vacuum chamber, and thereby remove harmful gases (we can also pour directly into a mold in the vacuum chamber). The secondary ladle is then taken out of the chamber and ingots of suitable size for hardened steel rolls can be cast under a blanket of inert gas.

### LESS GAS MEANS SOUNDER STEEL

Because the vacuum-casting method reduces the volume of hydrogen and other gases, the steel is sounder, tougher, and cleaner than air-cast steel. It is this greater internal soundness which reduces the hazard of roll breakage.

### OVER 350 ROLLS NOW IN SERVICE

In the past several years, we've produced and shipped more than 350 large, vacuum-degassed hardened steel rolls. The outstanding performance of these rolls in our own mills confirms the superior soundness of vacuum-cast rolls as compared to air-cast rolls.

### FAST DELIVERY . . . NO EXTRA COST

You have everything to gain (less roll breakage), nothing to lose (no price extra) by making your next purchase of hardened steel rolls Bethlehem vacuum-degassed rolls. Deliveries are excellent. Our sales offices are ready to give you the *whole* interesting story of this new Bethlehem development. Call or write the office nearest you today. Or write to us at Bethlehem, Pa.

**LOOK FOR THIS LABEL** on the packing of the hardened steel rolls you buy. It's your guarantee that your rolls are forged from Bethlehem vacuum-degassed steel . . . steel that minimizes the hazard of roll breakage in your plant.

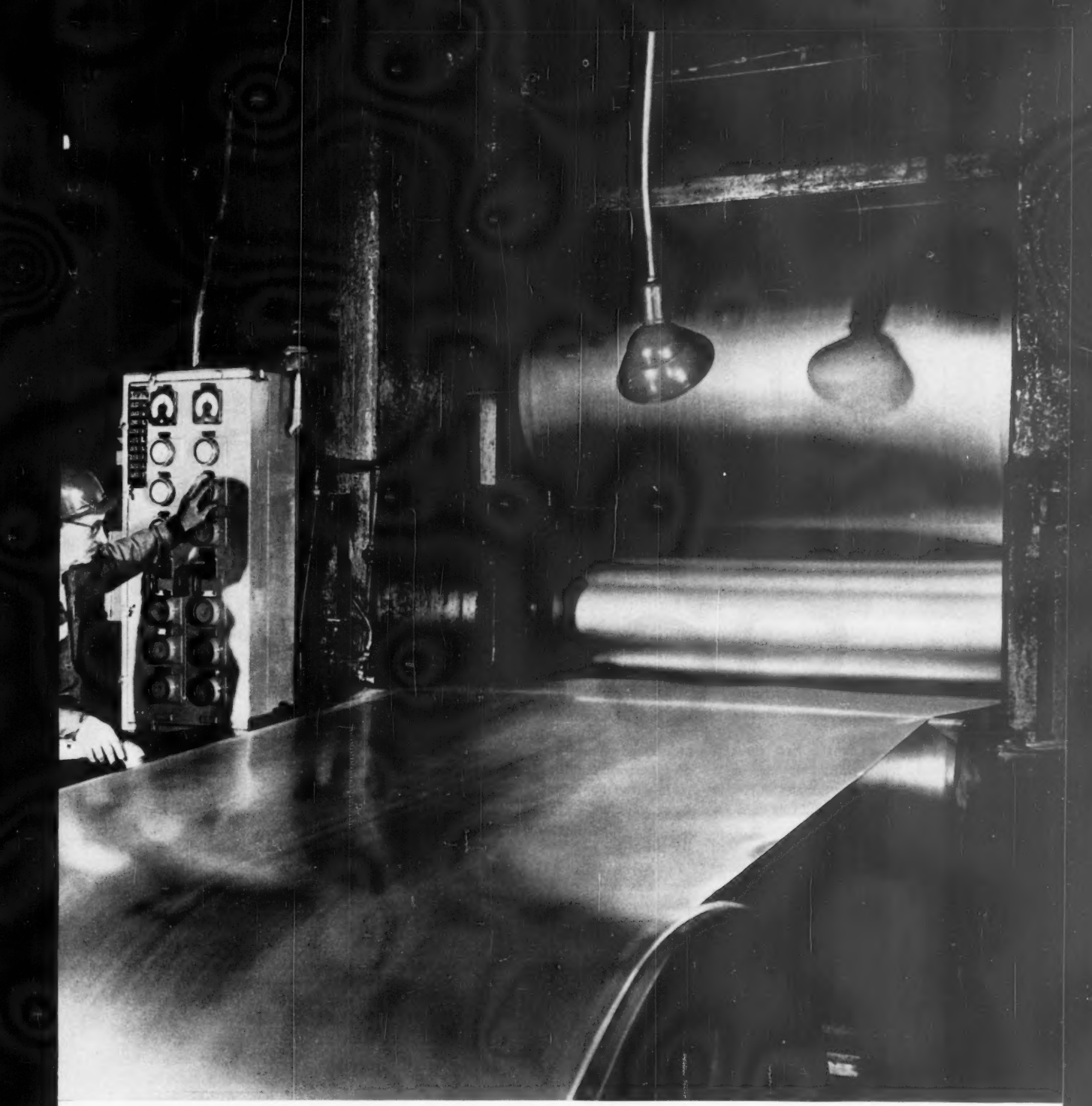
**LOOK FOR THIS "V" STAMP** on the ends of the rolls you buy . . . "V" is for vacuum. You'll find this permanent identification on every Bethlehem roll from now on . . . because from now on Bethlehem will forge *only* from vacuum-degassed steel.

BETHLEHEM STEEL

**BETHLEHEM**

**VACUUM-DEGASSED**

**HARDENED STEEL ROLL**



**BETHLEHEM VACUUM-DEGASSED ROLLS** are made for every application—cold-rolling steel sheet, strip, tinplate, and non-ferrous metals. Every roll meets your specifications exactly on size, shape, hardness, and finish.

Steel

For strength
. . . economy
. . . versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*Export Sales:* Bethlehem Steel Export Corporation

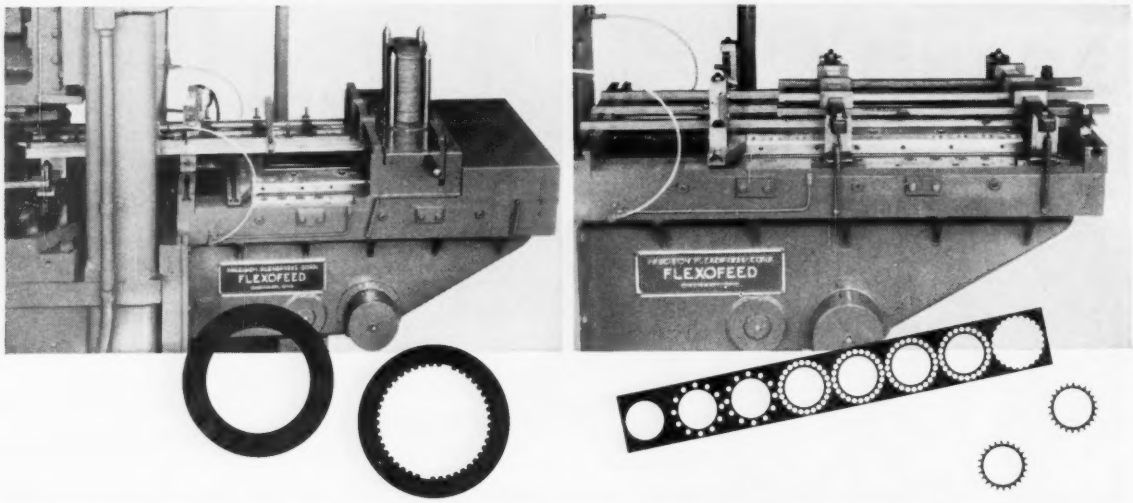
# BETHLEHEM STEEL

BETHLEHEM STEEL

PRECISION® Quarterly NUMBER 6

PRECISION WELDER AND FLEXOPRESS CORPORATION, 3520 Ibsen, Cincinnati 9, Ohio

# Feed Stamps Out Press Idle Time




CINCINNATI – For the first time, a high-productivity press can become a whole stamping department in one machine. The secret is Flexofeed, a remarkably adaptable mechanism that keeps a press busy because it can feed stock from a coil, or blanks from a magazine, with equal accuracy and agility.

The changeover from coil stock to blanks, or vice versa, is fast (sometimes little longer than it takes to change the die), because only the top reciprocating part of the Flexofeed is replaced. The basic structure – frame, gearing, and linkage – remains permanently fixed to the press.

FLEXOPRESS, NATURALLY – Flexofeed was designed to operate hand-in-glove with a Precision Flexopress, for what better way can you get full-time high productivity in your stamping department? The Flexofeed is adjustable for various widths and feed increments within a range that covers most applications of high productivity presses. It maintains absolute control over the stock up to the instant of impact.

Progressive die work and second operations on the same machine? Not only practicable, but profitable if it's a Flexopress equipped with Flexofeed.

PROOF POSITIVE – A large automobile parts manufacturer is stamping clutch plates for automatic transmissions on a 125-ton straight side Precision Flexopress equipped with Flexofeed. The blanks are 5″ diameter steel circles, .040″ thick. The manufacturer hoped for production of 200 plates a minute and is getting 250.

In a few days he turns out all the clutch plates he can use for a while, so in a couple of hours he shifts to the progressive stamping of bearing spacers from coiled steel stock, also at 250 per minute.

In another couple of hours he can be stamping blanks again. We hesitate to call this a "universal" feed because it sounds like bragging, but you can see that we are tempted. PRECISION

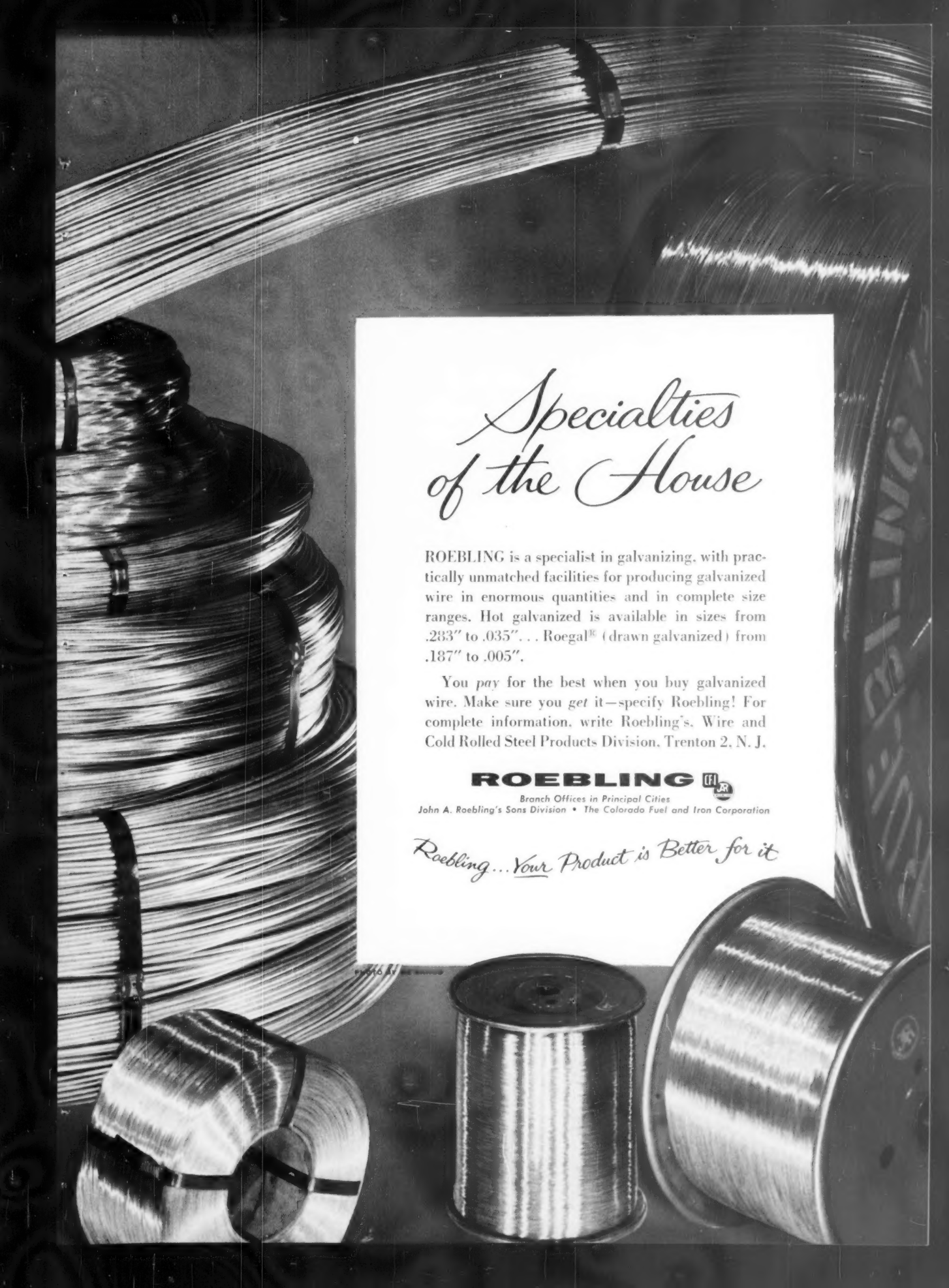
## THE WELDER THAT WOBBLES ON PURPOSE

Suppose you want to weld thin walled, 3″ diameter tubing to end flanges of the same material – 20 gage aluminized mild steel. Do you call in a brazing expert, or do you decide to punt?

A Michigan manufacturer of space heaters had a better idea. He called in Precision Welder and Flexopress Corp., and discovered an idea ready-jelled to solve his problem.

It's a Wobble-Head Welder (honest). A cup-die, mounted eccentrically on a rotating shaft, literally wobbles around the circumference to be welded, making magnificently clean ring welds from ¾″ to 6″ in diameter.

Now the Michigan manufacturer is happily welding sheet metal heat exchangers, and if you have flanges to weld to tubes, or tubes to weld to tanks, or some such, you can be happy too with a Precision Wobble Head Welder. Call us about it today.




# *Specialties of the House*

ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal® (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! For complete information, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

**ROEBLING**

*Branch Offices in Principal Cities*
*John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation*

*Roebling... Your Product is Better for it*

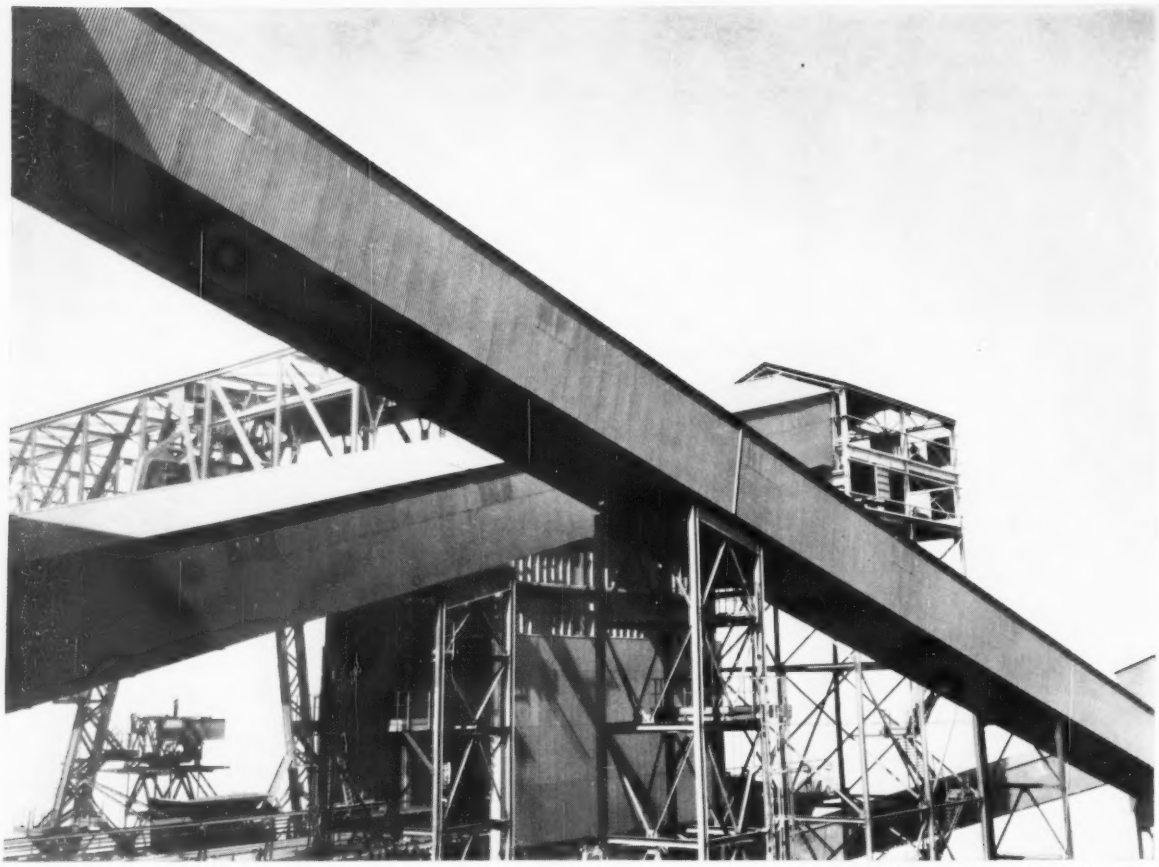
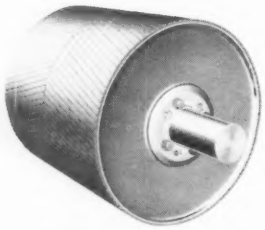
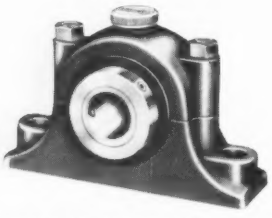


Photo courtesy of McDowell Co., Inc.

# Dodge dependability built into sinter plant conveyor system at Inland Steel



**DODGE TAPER-LOCK STEEL CONVEYOR PULLEYS**



**DODGE DOUBLE INTERLOCK PILLOW BLOCKS WITH TIMKEN BEARINGS**

Dodge Taper-Lock Steel Conveyor Pulleys and Dodge Double Interlock Pillow Blocks with Timken Tapered Roller Bearings contribute their dependability to this new sinter plant. They are an important part of the extensive conveyor system engineered by Dwight-Lloyd Division of McDowell Company, Inc., Cleveland.

Maximum strength with minimum weight is provided by these rugged conveyor pulleys. Their steel rims, discs and hubs are fused together into jointless drum construction for terrific impact resistance. With the unsurpassed holding power of Taper-Lock mounting there is no "walking on the shaft."

Dodge Double Interlock Pillow Blocks (with Timken Tapered Roller Bearings) were chosen for this hard service. They are rugged, compact, fully self-aligning—with substantial radial and thrust capacities. The extra long inner race distributes load over a greater shaft area. They are adjusted, lubricated and sealed at the factory—for a long life of dependable service.

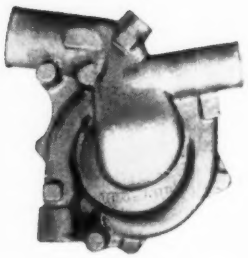
**DODGE MANUFACTURING CORPORATION, 4400 Union St., Mishawaka, Ind.**

**DODGE**

*of Mishawaka, Ind.*

**CALL THE TRANSMISSIONEER**—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Equipment."

# lower production costs with Decatur quality castings



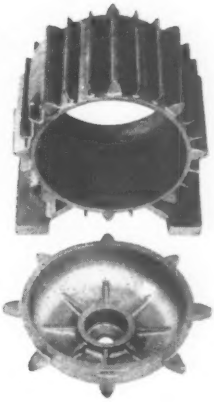
In the highly competitive field of gray iron castings, buyers constantly seek greater reliability at lower cost. They lower costs by using castings which require minimum finishing and have the lowest rejection rate.

Decatur Quality Castings® have exceptionally smooth surface finish comparable to shell or permanent mold castings. When required, precisely controlled heat treating in our furnace gives these castings the uniform metallurgical properties necessary for high production machining. Preparation of unmachined areas is usually unnecessary.

Decatur castings are shipped to your plant in our trucks when quantities permit to insure prompt service.

We are light gray iron and alloyed iron specialists supplying castings weighing a few ounces to 100 pounds.

D®



## THE DECATUR CASTING CO.

*Decatur Quality Castings® Light Gray Iron and Alloyed Iron Specialists*
*Decatur, Indiana • Phone: Decatur 3-2700*

## Baker Industrial Trucks switches to Gulfcut® 21C

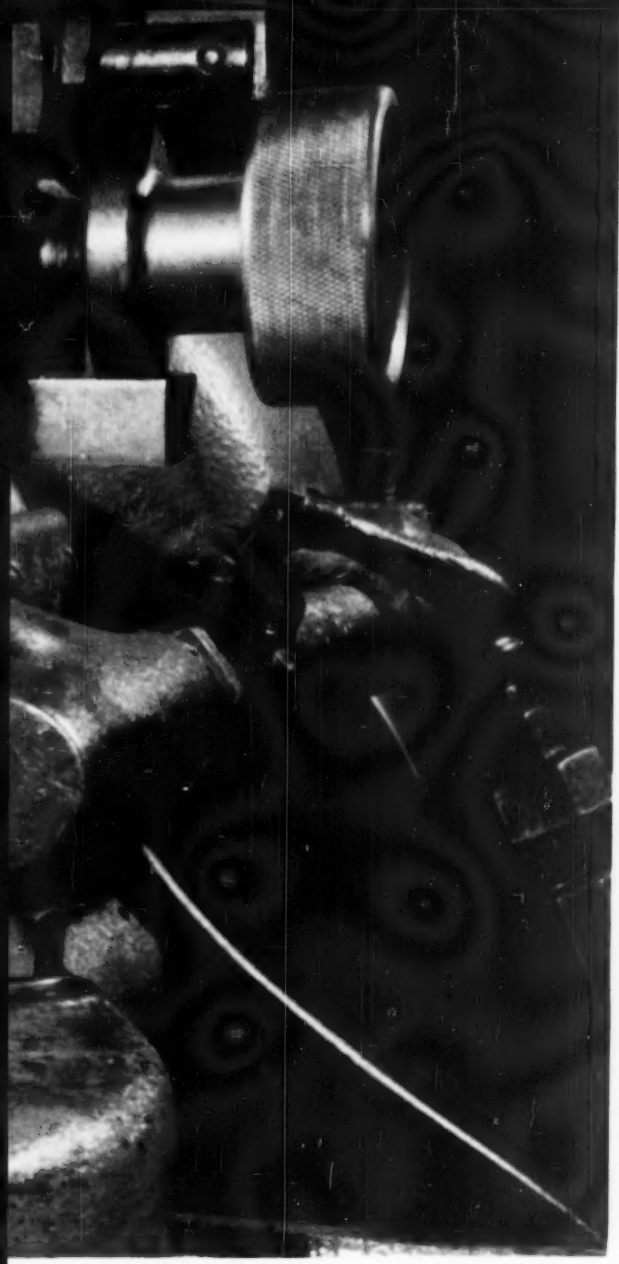
# GULF MAKES THINGS

After a series of comparative cutting oil tests, Otis Elevator Company, Baker Industrial Trucks Division, Cleveland, switched to Gulfcut 21C oil for hobbing their spline shafts, gears, axles, and other drive components. Here's why.

"Tests were carried out under actual work conditions," explains Plant General Manager Eugene Caldwell. "In one test, the workpiece was a 42-tooth spur gear forging of SAE 4142 steel, heat treated to Rc 20-27 hardness and cut on a Barber-Colman gear hobber. The oil we had been using gave us 10 to 12 pieces per hob shift. With Gulfcut 21C, we got 22 pieces.

"In another test, we hobbed Rc 23-34 steel spur gears on a Fellows machine. With our old cutting oil, we used to finish 10 to 12 gears per hob shift. With Gulfcut 21C we finished 20 pieces before regrinding."

Other production tests resulted in similar improvements. Says Mr. Caldwell: "By switching to Gulfcut 21C oil for these applications we've doubled tool life while maintaining close tolerances and fine finishes."



Mr. E. Caldwell, Plant Manager for Otis Elevator Company, Baker Industrial Trucks Division, Cleveland, explains Baker quality points to Thomas F. Irving, Gulf Sales Engineer.

Splines being cut for a Baker lift truck axle. Cutting oil is Gulfcut 21C.

## oil, doubles tool life . . .

# RUN BETTER!

Gulfcut 21C is a sulfurized mineral oil. Its transparent light color permits close observation of the workpiece. It stands up well under tough machining conditions because it provides greater sulfur activity over the entire range of the cutting operation.

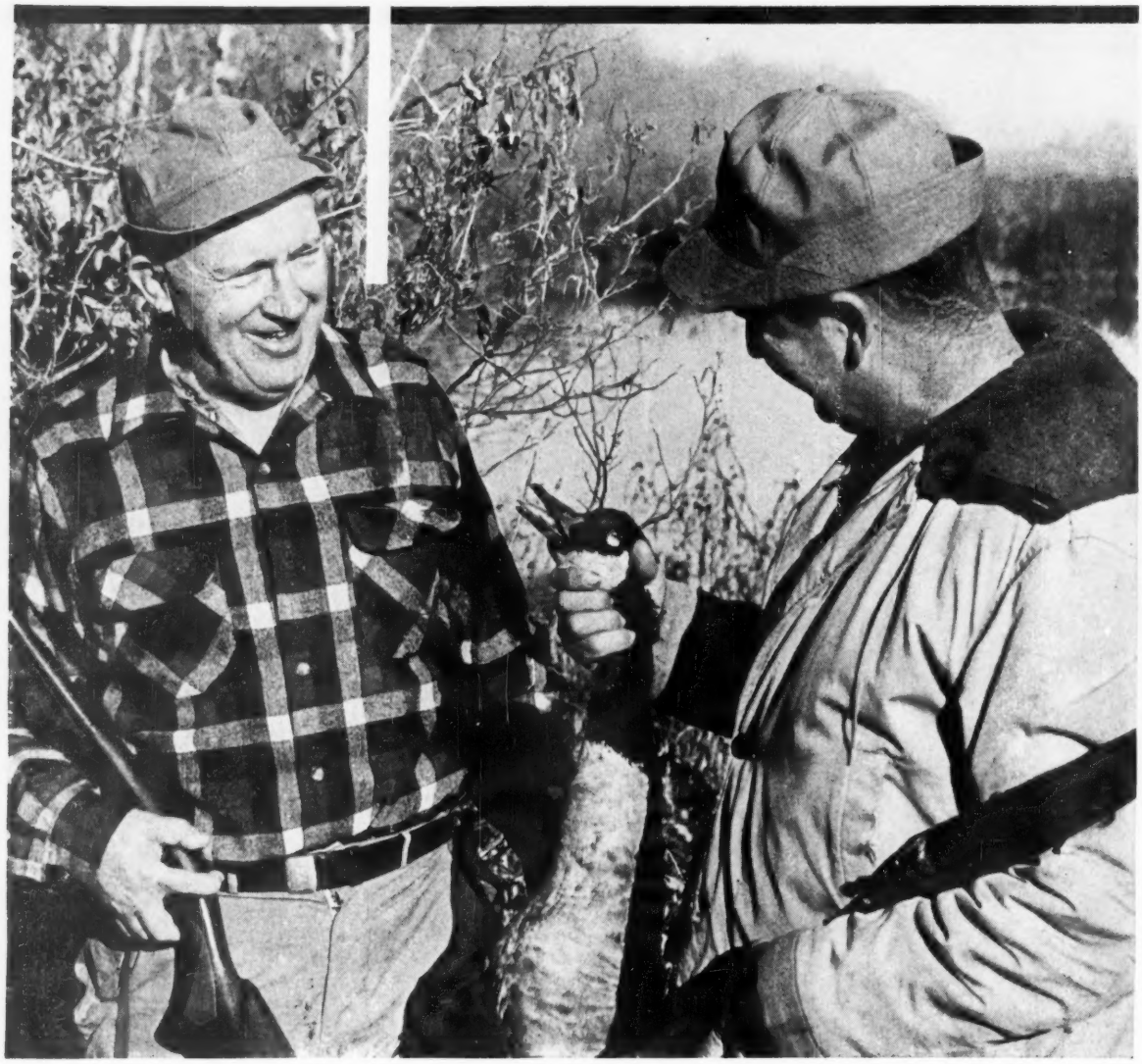
See for yourself how Gulf makes things run better! Call your Gulf Sales Engineer at your nearest Gulf office. It's his business to help. Meanwhile, write for your free copy of "Metal Machining with Cutting Fluids," the new 116-page handbook on their selection and use.

**GULF OIL CORPORATION**
Dept. DM, Gulf Building
Houston 1, Texas

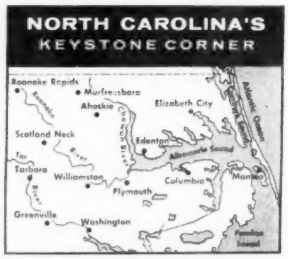
GULF

SP-9865

# "And we can still be at the new plant before nine!"



A couple of hours in a duck blind before the plant opens? That's perfectly feasible when your industry is located in northeastern North Carolina. For the same rivers and lakes that mean plentiful industrial water also mean fine shooting, fishing, and summer water sports. ■ Ask VEPCO about the abundant timber, mild climate and many other advantages of this key area . . . including the fact that North Carolina home-grows two willing, trainable workers for every one who retires or moves away. For a list of available locations, or free confidential site finding help in this land of cordial government and friendly communities, write, wire or phone VEPCO today.




**VIRGINIA ELECTRIC and POWER COMPANY**

Clark P. Spellman, Manager—Area Development, Electric Building, Richmond 9, Virginia • MIlton 9-1411

SERVING THE TOP-OF-THE-SOUTH WITH 1,990,000 KILOWATTS — DUE TO REACH 2,580,000 KILOWATTS BY 1962

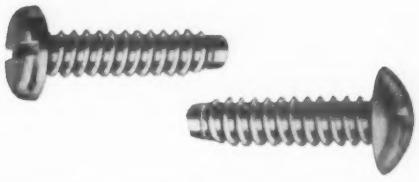
# Need quick delivery on ALCOA ALUMINUM FASTENERS? Pick up your phone!

It's that easy. Like calling your own stock room and having what you need sent over—aluminum bolts, nuts, rivets, machine screws, wood screws, sheet metal screws, washers, whatever your job calls for in standard sizes and types!

There's a local distributor nearby, with full stocks of Alcoa® Fasteners. He offers the largest line, the fastest deliveries.

Not to mention top quality that spells lower production costs for you. Alcoa Aluminum Fasteners offer many advantages: corrosion resistance; full threads; no burrs; fully heat-treated, high-strength alloys—and always a *full count*. You get what you pay for, every time.

Look in the Yellow Pages. Call your Alcoa distributor. Get all the light, strong, attractive, bright Alcoa Aluminum Fasteners you need. Want more information and samples first? Just mail the coupon!



**ALCOA ALUMINUM**

ALWAYS FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS

Aluminum Company of America
2001-J Alcoa Building, Pittsburgh 19, Pa.

Please send me complete specification data and samples of Alcoa Aluminum Fasteners.

NAME_____ TITLE_____

COMPANY_____

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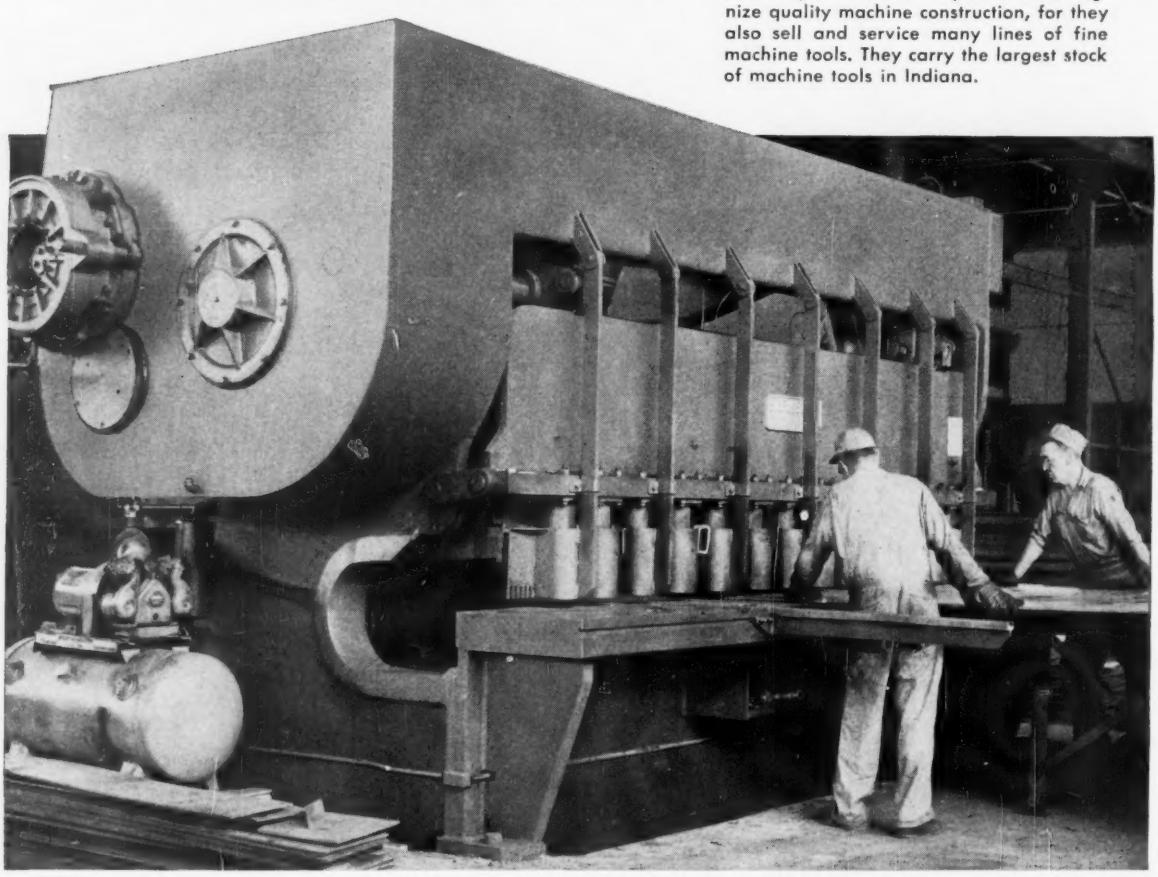
# STEELWELD SHEAR ENABLES STEEL WAREHOUSE TO PROVIDE DELUXE SERVICE

## *Indianapolis Supplier Cuts Plates To Suit Customers' Needs EXACTLY*

This Steelweld Shear is much appreciated at the Indianapolis Machinery Co., Inc. And they should be in a position to recognize quality machine construction, for they also sell and service many lines of fine machine tools. They carry the largest stock of machine tools in Indiana.



WITH a Steelweld Pivoted-Blade Shear that has been operated continuously in its steel warehouse since 1953, the Indianapolis Machinery Co., Inc., Indianapolis, furnishes metal cut to exactly meet its customers' requirements.

This usually means thicknesses from 3/16 to ¾ inch, widths varying from a few inches to 12 feet and lengths to the maximum available from the mills. The metal may be mild steel, stainless or any of a number of special alloys. Whatever the metal or thickness, the cuts are straight and accurate with negligible burr, because the knife clearance is always adjusted to produce the best results.

Some orders call for strips of type 304 stainless, 5/16 and ⅜ inch thick by 1¾ and 2¾ inch wide. Others call for hard abrasive-resisting steel in strips ⅜ by 2 and 2¼ inches. Because of the shear's very low knife rake angle, such items are made with extremely little twist, camber and bow.

The air-operated clutch and brake have proven phenomenal by customary shear standards. Despite the tens of thousands of times the clutch and brake have opened and closed in making as many cuts over the years, the original linings are still in use. The action continues snappy and positive. The machine has its own air compressor mounted on one end.

Considering the large volume of shearing work done, the knife wear has been long and satisfactory. Knife grindings have been at least a year or more apart. This is attributed to not only the quality of the knives, but to the low rake at which they operate and also the correct knife clearance used for all cutting.

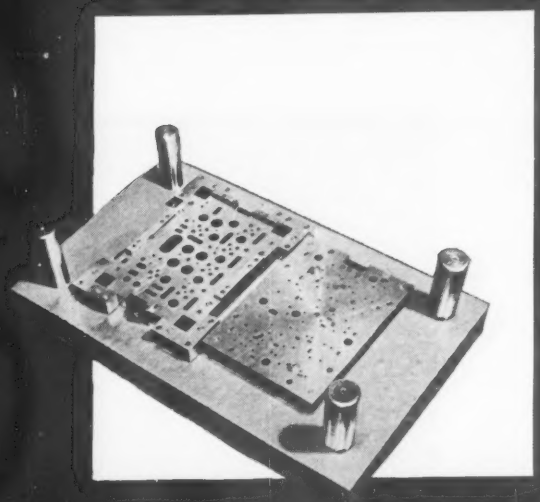
*Write for free copy of catalog No. 2011*

**STEELWELD**

PIVOTED BLADE **SHEARS**

**Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.**

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7862 E. 282 ST. • WICKLIFFE, OHIO



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**order after order after order...** minimum size change and distortion... low temperature heat treating... uniform deep hardenability... freedom from scaling... good machinability... exceptional toughness with good hardness... no preheating in hardening. From start to finish you enjoy exceptional simplicity and safety and predictable performance. Produced by the MEL-TROL® Process... Only Carpenter VEGA-FM assures such uniformity of benefits. Use this MATCHED SET of Air-Hardening Tool and Die Steels—VEGA-FM (Type A-6), No. 484-FM (Type A-2), and No. 610-FM (Type D-2)—for proper selection and consistently better results. Call your Carpenter SERVICE-CENTER for prompt delivery.

*Carpenter* **steel**

you can do it ***consistently*** better with Carpenter Tool and Die Steels

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
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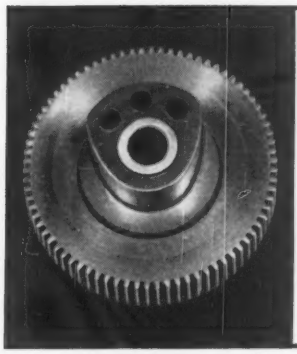
THE
AMPLEXOLOGIST

**The Amplexologist** is sometimes detected about to pocket a part in a prospective customer's plant. Especially a part being machined from a rough casting or hogged out of steel. Just the sight of it starts wheels whirling in the Amplexologist's head.

*Why all the machining? Is this scrap necessary? Could we make the part out of powder metal? Eliminate machining costs. Eliminate scrap. Deliver a finished precision part for the price of a rough casting. Less, maybe?*

Well! Thoughts like these are enough to make the Amplexologist forget his mother's maiden name. No wonder it sometimes takes a pointed stare to remind him to ask permission to pick up the part and take it back to the office and figure precisely how to make it better and cheaper through advanced powder metallurgy.

Customers usually forgive him the sins of his enthusiasm. It has saved them thousands of dollars. We can afford to forgive him, too. He has helped make us the world's largest, most experienced producer of powder metal parts. He is the reason manufacturers say: **When it comes to powder metallurgy—Amplex has the answer.**



**FOR THE BENEFIT OF SKEPTICS . . .**

The part shown is a combination gear and compound cam. Formerly, it was an 8-piece assembly: fibre gear, steel flange, horizontal steel cam, vertical steel cam, four steel screws. Then the Amplexologist went to work. Today, the part is produced by powder metallurgy as a single unit—a finished precision part that requires no machining.

Cost reduction: about 90%. What's more, the powder metal part provides longer wear, quieter operation.

*Photograph permission RCA.*

AMPLEXOLOGIST

***SEND COUPON*** **. . . if you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.**

AMPLEX DIVISION • CHRYSLER CORP. • Dept. S-E
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

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COMPANY_____

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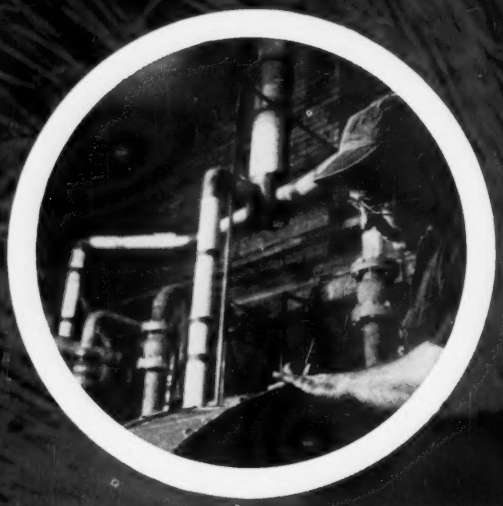
CITY_____ STATE_____

PRODUCT_____

**AMPLEX**

**DIVISION CHRYSLER CORP.**

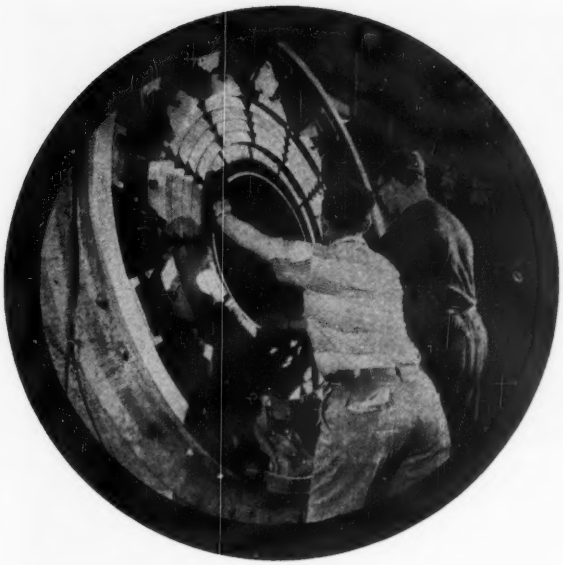
A CHRYSLER PRODUCT **OILITE**



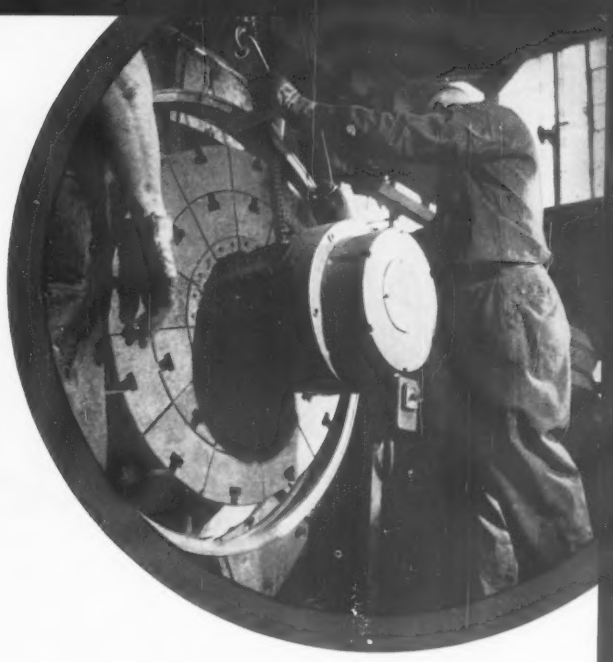
# Amweld rings up $14,621

When Amweld experienced several operating problems with its 12 Flash Butt welders, Mobil was consulted. Oil oxidation and metallic contaminants were causing abnormal pump wear, sticky valves, overheating. Hydraulic response, pressures and cycle times necessary for correct welds could not be maintained. Production tie-ups and maintenance costs skyrocketed. The solution: a superior Mobil hydraulic oil and proper fluid maintenance, including machine modifications to screen out weld scale. Savings to Amweld: $8,680 in one year.

In Amweld's main compressor room 4 compressors are all tied into a common header. To increase compressor efficiency and reduce condensation in cylinders and air lines, Mobil recommended changes in the location of intake openings, reduced flow rate of jacket cooling water, and increased water flow rate in the after-cooler. Result: an increase of 5% in compressor efficiency, and cooler, drier air in plant air lines.



On 8 ring-sizing machines Amweld was experiencing hydraulic difficulties similar to those in the butt welding units. Oil deposits, sticking valves, pump failures, etc. were common problems. 1040 maintenance man-hours a year were required to keep the equipment operating. But again the introduction of a Mobil hydraulic oil and preventive maintenance procedures slashed this labor cost, saved Amweld $2,005 the first year.



On three of Amweld's expander units, brass wear plates on the expanding mandrel were undergoing serious wear. Frequent replacement of these plates, with attendant labor costs, meant a $3,936 expenditure for Amweld in one year alone. Studying the problem, Mobil Engineers recommended an extreme pressure grease. In the year since this Mobil product was introduced, not a single replacement has been made.

# *savings with Mobil!*

**A leading producer of welded rings, American Welding & Manufacturing Co. cuts maintenance costs with Mobil Lubricants and engineering service.**

Specializing in the production of welded rings, bands and assemblies, American Welding has developed methods and techniques for precision-welding alloy steels and non-ferrous materials in both light gauges and heavy sections. Parts are supplied "as-welded," or machined and finished, to prime contractors, and include components for jet engines and missiles.

Critical tolerance requirements demand rigid maintenance procedures at Amweld. And Mobil products and engineering service have made significant contributions in terms of minimized machine downtime and consistent savings in lubricant and parts costs. Working in close cooperation with Amweld technical personnel, Mobil has made recommendations that have saved this producer $14,621.

Mobil's extensive background in lubrication may help you achieve similar savings in your plant. Your Mobil Representative is the man who can tell you.

Mobil

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MOBIL OIL COMPANY, 150 E. 42nd St., New York 17, N.Y.

# do your plans include mechanized drop forging?

***The CECOMATIC Forging Process,*** based on the revolutionary Chambersburg Impacter, makes possible the continuous and automatic production of precision drop forgings. If you are a manufacturer whose products include drop forged components, you must consider mechanized forging in your plans for the future . . . . . your competition will do so—sooner or later. Practical information, with examples of successful mechanized forging operations, are included in the brochure, "The Automatic Production of Forgings in Closed Dies". Write for a copy today, to Chambersburg Engineering Company, Chambersburg, Pennsylvania.

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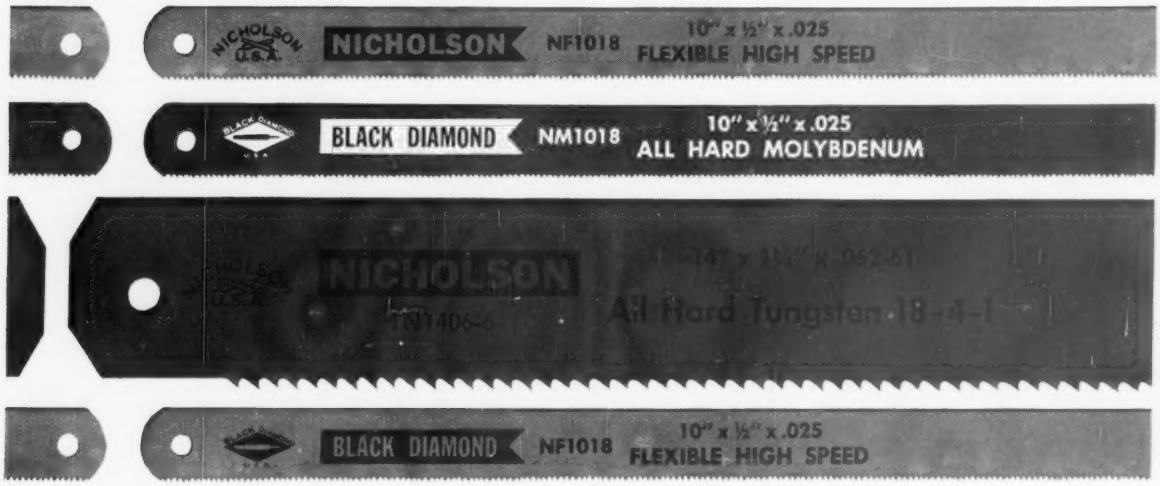
DESIGNERS AND MANUFACTURERS OF THE IMPACTER

# LOOK FOR THESE TRADEMARKS

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If you're looking for as fine a blade as money can buy . . . specify Nicholson or Black Diamond. They're among the best respected brands in the metal-working industry.

Here's part of the reason why . . . we make our blades from the finest available steel, according to the latest manufacturing methods. We inspect them again and again. We approve only those blades that meet our high standards.

More important, you can be confident that you're getting quality blades to produce quality work.

A good many industrial blade users and buyers are switching to the Nicholson and Black Diamond brands. The best gauge of the way they like them is the way they keep reordering them. The next time *you* order blades . . . order Nicholson or Black Diamond blades. You'll be specifying the economy of top quality.

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# AUTOMATIC UPSETTING!

## Let National Tong-Feed Forging Machines Produce *Your* Forgings at Lower Cost

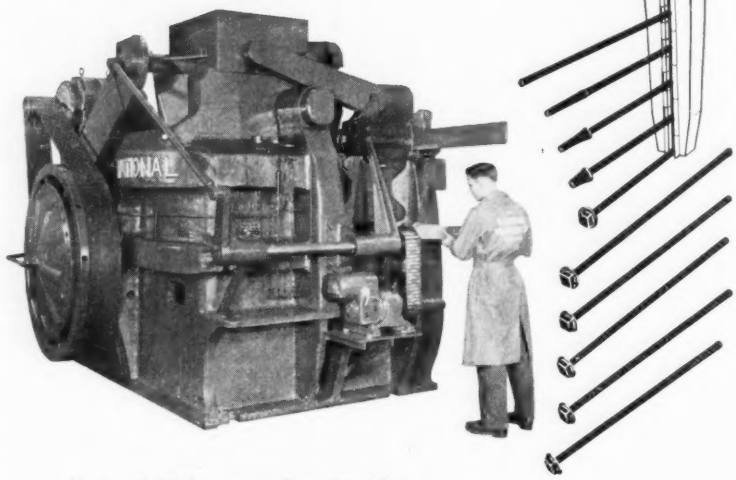
Hot Forging is going automatic!

Well, not *all* of it, but many forward-looking forge plants are taking a fresh look.

For example, all of the upset-type forgings above were made on National Automatic Tong-Feed Forging Machines. Seven sizes are now proved and presently operating in production: 1", 1½", 2", 3", 4", 6" and 7½".

The method offers extremely interesting opportunities of raising production while reducing labor and operating costs. May we help you investigate?

Let's start by looking over your jobs, preferably here in Tiffin. Here we can have a productive session devoted entirely to your plans, but without obligation.



National 4" Automatic Tong-Feed Forging Machine with discharge conveyor.

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*TIFFIN, OHIO, U. S. A.*

**HARTFORD** **DETROIT** **CHICAGO**

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CAPEWELL

# COILGUARD

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## EASIER TO STOCK, IDENTIFY AND USE

★ Coilguard is designed and engineered to guarantee smooth easy dispensing and recoiling. Cut end does not protrude.

★ Coilguard's high impact plastic protects band saws in transit and in the warehouse. Two-way labeling permits identification when stacked vertically or flat.

★ Special nesting pins allow "shoulder to shoulder" stocking. Hex shape prevents rolling.

★ Through center hole facilitates handling, is ideal for mounting on pegs or pipes for dispensing.

**Only Capewell Distributors carry bandsaws in the convenient Coilguard package. One more reason why your Capewell Distributor should be your source for all the saws you need—hand hack saws, power hack saws, band saws and hole saws.**

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| **ARIZONA** | |
| Phoenix | Earle M. Jorgensen Co.*†• |
| **CALIFORNIA** | |
| Los Angeles | Allen-Fry Steel Company* |
| | Baker Steel & Tube Co. • |
| | Coulter Steel & Forge Co.*† |
| | Earle M. Jorgensen Co.*† |
| | Kilsby Tube Supply, Division of Republic Supply Co. of Calif.• |
| | Joseph T. Ryerson & Son, Inc.*• |
| | Service Steel Division Van Pelt Corp.• |
| | Tubesales• |
| Oakland | Coulter Steel & Forge Company (Emeryville)*† |
| | Earle M. Jorgensen Co.*† |
| | Joseph T. Ryerson & Son, Inc.*• |
| San Francisco | Baker Steel & Tube Co.• |
| | Earle M. Jorgensen Co.*† |
| | A. Milne & Co., Inc. (Burlingame)† |
| **COLORADO** | |
| Denver | Earle M. Jorgensen Co.*†• |
| **CONNECTICUT** | |
| Windsor | SAE Steels, Inc.* |
| **GEORGIA** | |
| Atlanta | A. Milne & Co., Inc.† |
| | O'Neal Steel, Inc.*† |
| **HAWAII** | |
| Honolulu | Earle M. Jorgensen Co.*†• |
| **ILLINOIS** | |
| Chicago | Chicago Tube and Iron Co.• |
| | Hy-Alloy Steels Co.*• |
| | A. Milne & Co., Inc. (Melrose Park)† |
| | The Peninsular Steel Co.† |
| | Joseph T. Ryerson & Son, Inc.*• |
| | Service Steel Division Van Pelt Corp.• |
| **INDIANA** | |
| Indianapolis | The Peninsular Steel Co.† |
| **KANSAS** | |
| Wichita | Earle M. Jorgensen Co.*†• |
| **LOUISIANA** | |
| New Orleans | Earle M. Jorgensen Co.*†• |
| **MASSACHUSETTS** | |
| Boston | A. Milne & Co., Inc.† |
| | Joseph T. Ryerson & Son, Inc. (Allston)*• |
| **MICHIGAN** | |
| Detroit | Alloy Steels, Incorporated† |
| | A. Milne & Co., Inc.† |
| | The Peninsular Steel Co.† |
| | Joseph T. Ryerson & Son, Inc.†• |
| | Service Steel Division Van Pelt Corp.• |
| | Tubular Sales• |
| Grand Rapids | The Peninsular Steel Co.† |
| **MINNESOTA** | |
| St. Paul | Paper, Calmenson & Company* |
| **MISSISSIPPI** | |
| Jackson | O'Neal Steel, Inc.*† |
| **MISSOURI** | |
| St. Louis | Ford Steel Company† |
| | Joseph T. Ryerson & Son, Inc.*• |
| **NEW JERSEY** | |
| Elizabeth | A. B. Murray Co., Inc.• |
| Englewood | Tubesales• |
| Jersey City | Joseph T. Ryerson & Son, Inc.*• |
| Kenilworth | A. Milne & Co., Inc.† |
| Linden | Bowsteel Distributors Corporation* |
| Newark | Faitoute Iron & Steel Company, Inc.* |
| **NEW YORK** | |
| Buffalo | The Peninsular Steel Co. (Tonawanda)† |
| | Joseph T. Ryerson & Son, Inc.*• |
| | Service Steel Division Van Pelt Corp.• |
| Garden City (L.I.) | Tube Distributors Co., Inc.• |
| New York | A. Milne & Co., Inc.† |
| **NORTH CAROLINA** | |
| Charlotte | Joseph T. Ryerson & Son, Inc.†• |
| **OHIO** | |
| Akron | The Peninsular Steel Co.† |
| Cincinnati | Ford Steel Company† |
| | Joseph T. Ryerson & Son, Inc.†• |
| | SAE Steels, Inc.* |
| | Service Steel Division Van Pelt Corp.• |
| Cleveland | A. Milne & Co., Inc. |
| | The Peninsular Steel Co.† (Bedford Heights)† |
| | Joseph T. Ryerson & Son, Inc.*• |
| | SAE Steels, Inc.* |
| Dayton | Alloy Steels, Incorporated† |
| | A. Milne & Co., Inc.† |
| | The Peninsular Steel Co.† |
| Toledo | The Peninsular Steel Co.† |
| **OKLAHOMA** | |
| Tulsa | Earle M. Jorgenson Co.*†• |
| **OREGON** | |
| Portland | Pacific Machinery and Tool Steel Co.† |
| **PENNSYLVANIA** | |
| Bristol | A. B. Murray Co., Inc.• |
| Butler | Keystone Pipe & Supply Co.• |
| Carnegie | A. Milne & Co., Inc.† |
| | Joseph T. Ryerson & Son, Inc.*• |
| McKeesport | A. B. Murray Co., Inc.• |
| Philadelphia | Capitol Pipe & Steel Products, Inc.• |
| | A. Milne & Co., Inc.† |
| | Joseph T. Ryerson & Son, Inc.*• |
| **TENNESSEE** | |
| Chattanooga | O'Neal Steel, Inc.*† |
| **TEXAS** | |
| Dallas | Earle M. Jorgensen Co.*†• |
| | Joseph T. Ryerson & Son, Inc.*• |
| Houston | Earle M. Jorgensen Co.*†• |
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| **UTAH** | |
| Salt Lake City | Coulter Steel & Forge Company*† |
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| Seattle | Coulter Steel & Forge Company*† |
| | Earle M. Jorgensen Co.*† |
| | Joseph T. Ryerson & Son, Inc.*• |
| Spokane | Joseph T. Ryerson & Son, Inc.*• |
| **WISCONSIN** | |
| Milwaukee | Joseph T. Ryerson & Son, Inc.*• |
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| London, Ontario | Vanadium-Alloys Steel Canada, Limited† |
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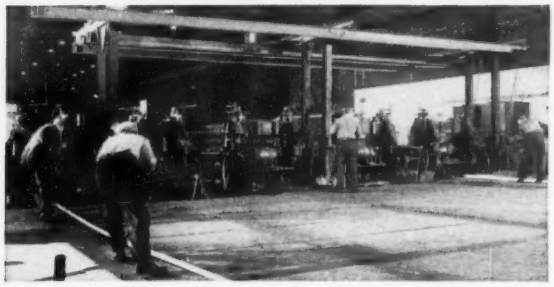
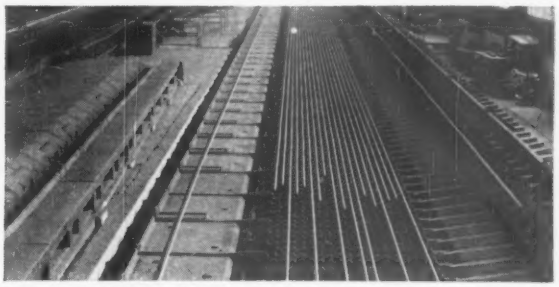
Your Steel Service Center supplies Timken® seamless steel tubing in carbon, alloy and stainless grades. And the Timken Company's 100% final inspection—of dimension, surface and internal quality—assures you it's the finest tubing available. Your Steel Service Center helps you save in other ways, too. It frees your inventory capital . . . releases your inventory space for more productive use. And you're assured of fast delivery of steel ready for use, cutting your processing cost, helping you maintain production schedules.



Timken graphitic tool steels are the most stable tool steels you can buy. Developed by Timken Company metallurgists, their structure contains a combination of free graphite particles and diamond hard carbides that gives you easier machinability and longer wear than ordinary tool steels. They are available only from your Steel Service Center.



You can get Timken alloy steel bars in a wide range of sizes and analyses. And when you use Timken steel, technical help is available from the Timken Company's own steel experts. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

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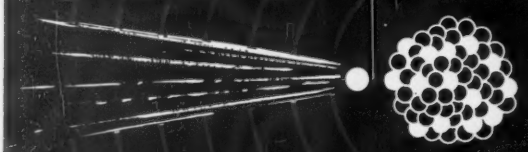
Stainless steel sheets, plates, strip, coils



Above: Schematic drawings show how nuclear fission occurs. One atom becomes two, releasing energy.

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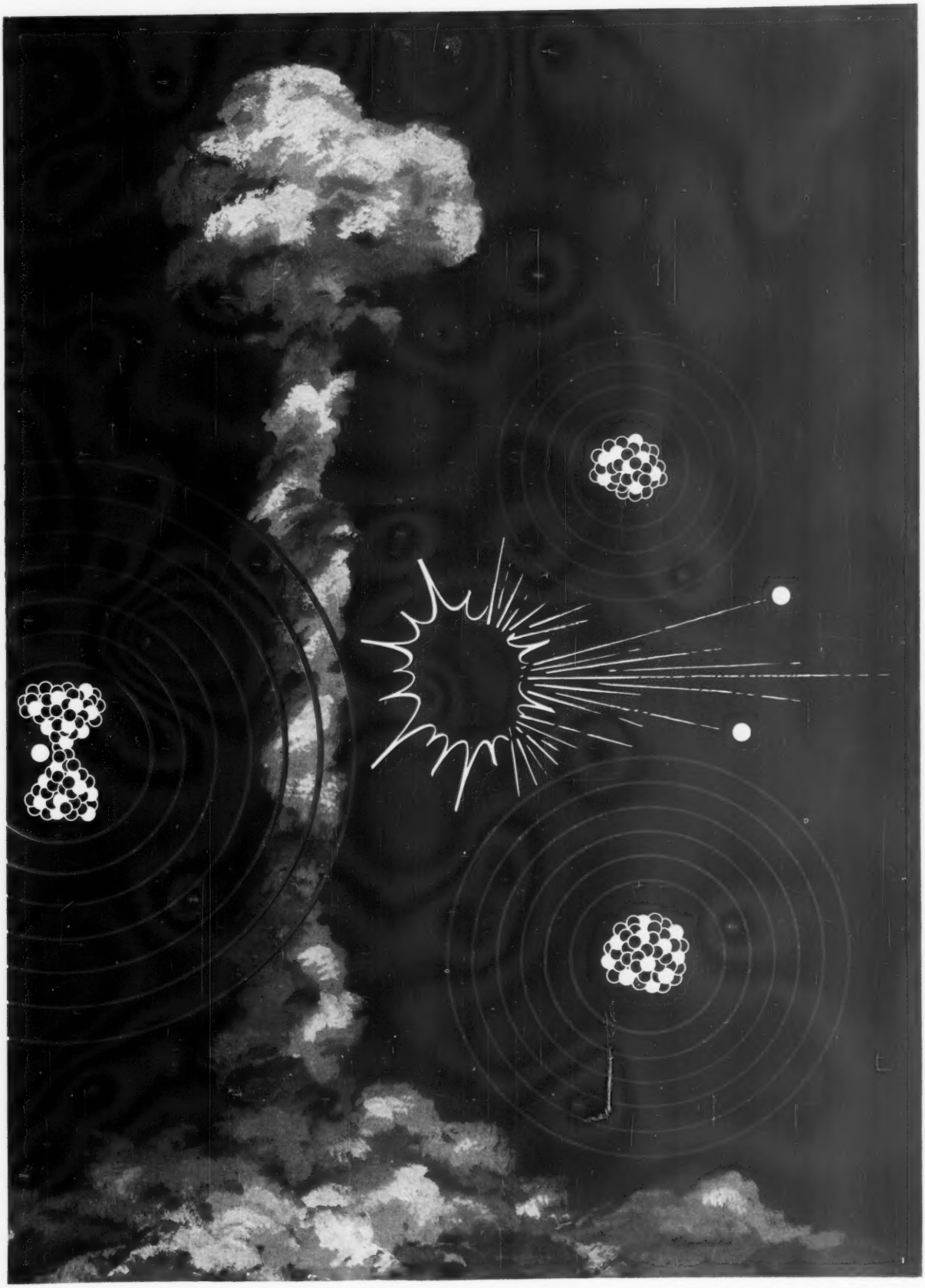

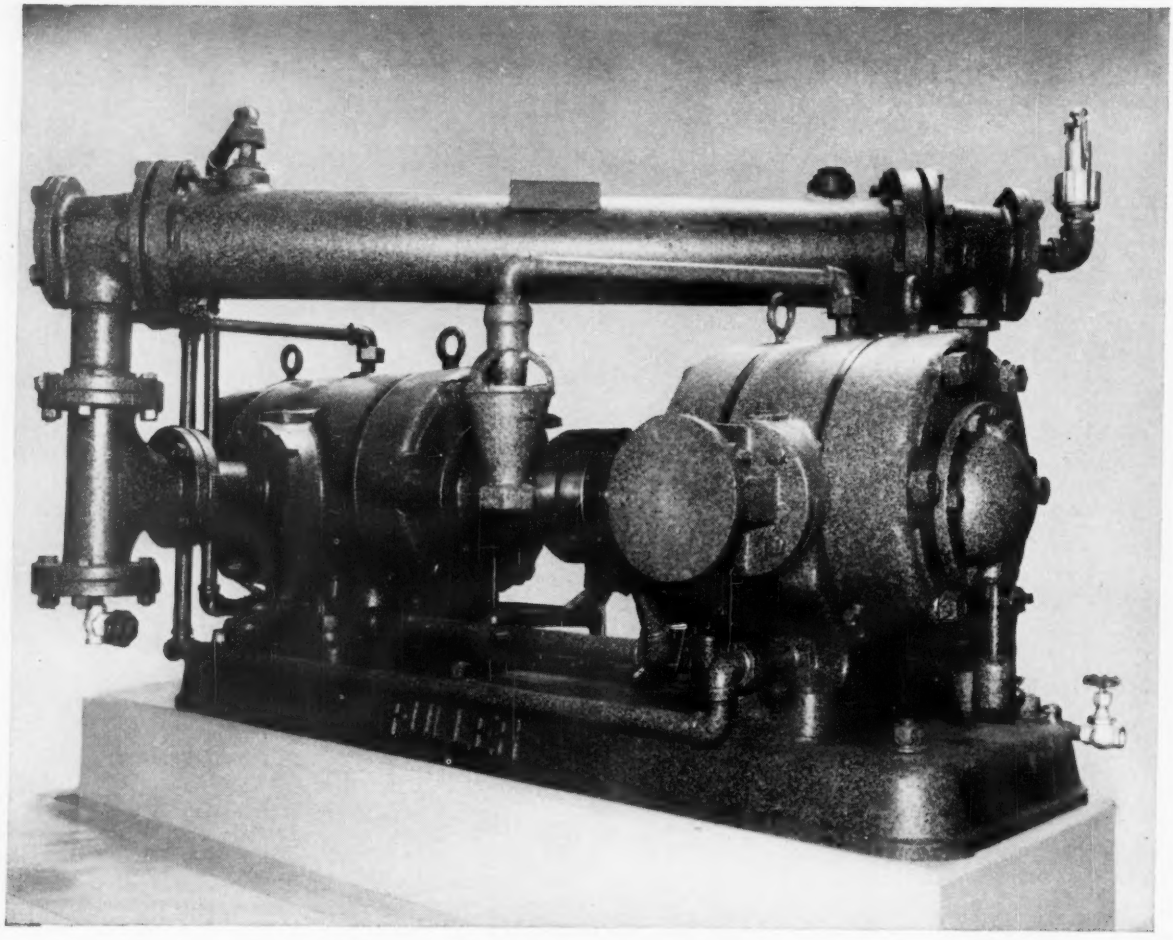

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Fuller Rotary Two-Stage Compressors equipped with Overhead Intercoolers fill the bill where space may be a problem. These compressors produce from 30 to 3300 cfm, pressures to 125 lb. gage and can be readily installed.

These compact Rotary Compressors are vibration-free, thereby eliminating the need for involved and expensive foundations or structural modifications.

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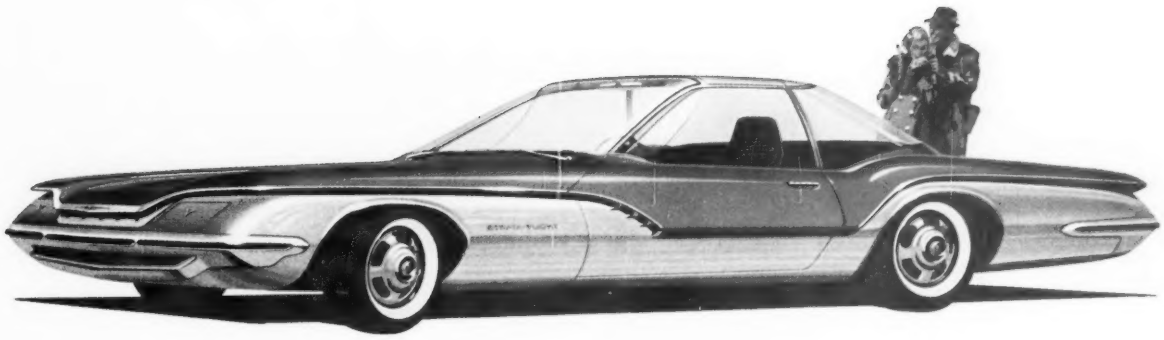
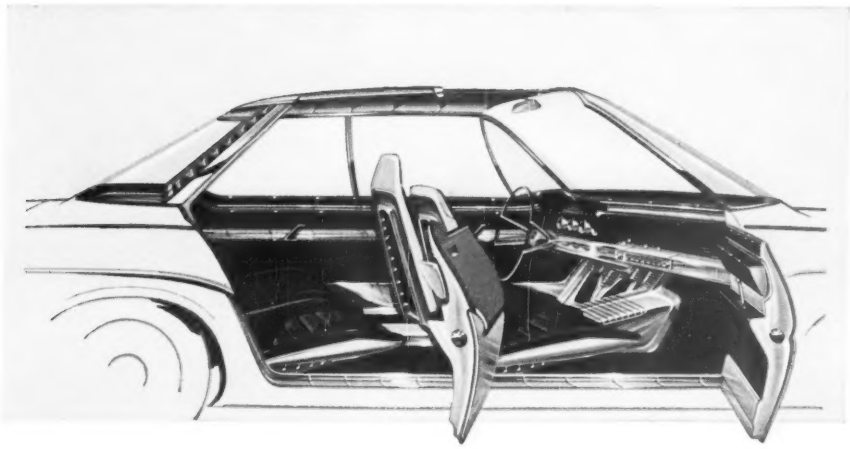


# stainless steel

No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

## There is nothing like stainless steel for AUTOMOBILES



McLouth Steel Corporation,
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*Manufacturers of high quality*
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Look for the **STEELMARK**
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# How a TRAK-RAK Crane Can Save You Money BEFORE IT'S INSTALLED....

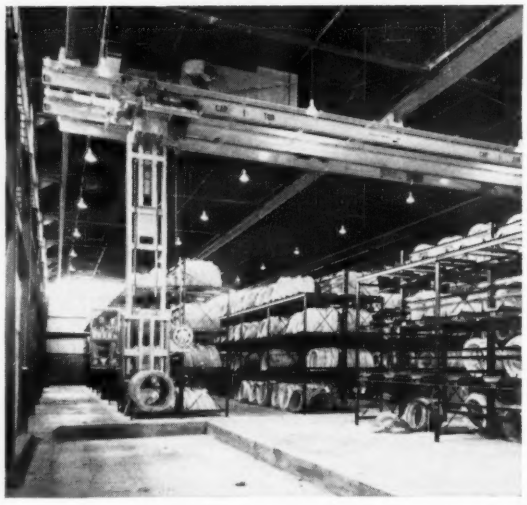
## And Pay For Itself in Time and Labor Savings After It Goes to Work!

Considering an addition to your present storage facilities—or planning construction of a new warehouse building? A TRAK-RAK Crane can save you money by permitting a sharp reduction in the overall size of the addition or building . . . and still enable you to store the same volume or tonnage.

Hundreds of installations in warehouses and plants of every type are proof of the speed, efficiency, and economy of the TRAK-RAK System. A recent installation at Chandler Products Corporation, Cleveland, is a case in point.

> In an area of 20,000 sq. ft., 7500 coils (2,500,000 lbs.) are stored four high—using the floor and 3-tiered racks. The TRAK-RAK Crane handles the entire stock, from unloading coils at the rate of 1000 lbs. per minute from trucks, to moving them in and out of storage. Manpower savings of 70% . . . increased handling speed and safety . . . optimum rotation of stock . . . and a considerable reduction in warehousing costs are reported by the Company.

**A TRAK-RAK Crane can be installed in your present warehouse area, enabling you to increase storage capacity, speed handling, and reduce costs. *Why not write for details now?***



**TRAK-RAK Crane at truck unloading area. Unit unloads 1000 lbs. of coil stock per minute.**

**CTC CHICAGO TRAMRAIL CORPORATION** | 1326 SOUTH KOSTNER AVENUE CHICAGO 23, ILLINOIS

STEEL
The Metalworking Weekly

# Metalworking Week®

September 12, 1960

## Record Construction Forecast for '60s: $650 Billion

Record new construction during the sixties is expected to provide a market for more than $650 billion in goods and services. George Cline Smith, chief economist for F. W. Dodge Corp., forecasts new building will rise from the current annual rate of $55 billion to $78 billion by 1969—a 43 per cent increase. That, he said, would be by far the largest market ever attained by any fabricating industry. His "conservative" projections, he says, imply a 1970 gross national product of $725 billion, "a somewhat higher rate of growth than the nation has enjoyed in the last few years," but "a little below the average rate for the whole postwar period." Maintenance and repair spending could add another $300 billion, he declares.

## Do Wives and Weather Restrict Promising Execs?

Status-loving wives and the lure of warmer climates are greasing the rungs of the ladder of success for promising executives, says the president of a large executive placement firm. To Lon D. Barton of Cadillac Associates Inc., some executives are missing their boats because of reluctance to accept transfers. Companies move men around in key positions throughout the country, he contends, as a major test of their worth to management teams. Wives, Mr. Barton explains, won't even allow their husbands to consider executive advancements that would uproot them from their P-TA vice presidencies and country club memberships. And the men—particularly West Coast executives—pass up more lucrative positions for desired climates, he points out.

## Kohler Co. Found Guilty of Unfair Labor Practices

Kohler Co., Kohler, Wis., has been found guilty by the National Labor Relations Board of unfair labor practices in another round in the six year old dispute between the plumbing fixture firm and the United Auto Workers. The decision can be appealed to the U. S. Circuit Court of Appeals. The board directed Kohler to bargain in good faith with Local 833 of the UAW. The strike, which began in April, 1954, has been one of the bitterest, longest, and costliest in the post-World War II period. The board said the unfair practices occurred after start of the strike constituting a failure by the company to bargain in good faith.

## Small Business Successes Outweigh Failures

Contrary to general opinion, the number of small businesses organized each year exceeds small business failures, a panel of experts agreed at the University of Michigan. UM Prof. William M. Hoad presented these statistics for 1958: 372,000 small businesses re-organized; 411,000 newly organized for a total of 783,000. In that year, 356,000 ceased operations. Cited as

Technical Outlook—Page 123

Market Outlook—Page 171

chief reasons for failures: 1. Inadequate knowledge of both the product they set out to make and the market they hope to cultivate. 2. An attempt to grow too quickly, thereby exceeding capabilities.

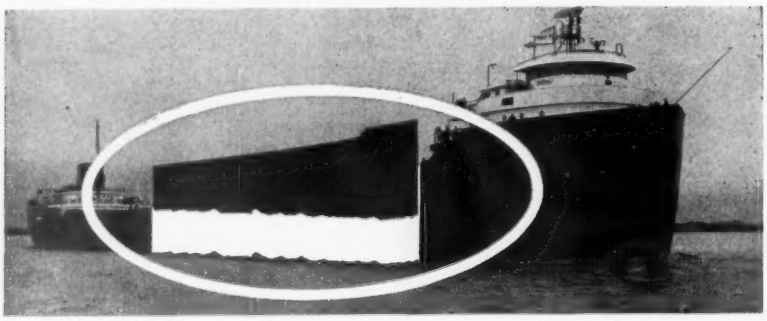
## Scrapped Cars: The Future Is Contaminated

As people buy more cars than ever before and trade them in sooner in the decade ahead, more autos will be scrapped. But a problem is sighted by a New York scrap dealer: Processing will become more difficult because these vehicles will contain greater amounts of contaminants such as copper, zinc, and aluminum. Luria Bros. & Co. Inc. says that once the aluminum engine block becomes standard, iron and steel scrapmen may find profit in scrapped aluminum. Scrapped cars constitute about 16 per cent of the industry's annual scrap tonnage, says Luria. On the average that's 4 million cars processed annually.

## Ford Admits Part of Its VW Size Car May Be Made Overseas

Ford Motor Co. is reportedly planning a four cylinder car of Volkswagen size, to be called the Cardinal. At least part of the new car might be built overseas, admitted K. D. Cassidy, vice president, industrial relations, in a letter to the United Auto Workers. But Mr. Cassidy said the car will not come this year or next. He stated: "Numerous cost advantages of producing this vehicle in Europe seriously handicap the entry into the American market of a comparable vehicle manufactured in this country."

## Stretching Lake Boats: Their Body Lies Over the Ocean



More 730 ft ore boats will be joining the Great Lakes fleet with huge midsections constructed in Germany. M. A. Hanna Co.'s *Atlantic Dealer* (at the Buffalo yard) and Cleveland-Cliffs' *Chiwawa* (at the Lorain, Ohio, yard) are being readied by American Ship Building Co. for 510 ft sections made in Hamburg's Schlieker Shipyard. The midsections will be towed 4000 miles to the Great Lakes via the St. Lawrence Seaway. Trips will take 40 days. The launching of the first of four midbodies at Hamburg last month is viewed by fleet owners as signaling a new lease on life for overage U. S. vessels. Total cost: Half that of a new ship.

## New Welding Standards Simplify Government Contracts

Last week's adoption of regular industrial standards for welding electrodes by the Department of Defense marks another step in government efforts to simplify specifications, standards, and practices. The new specification (MIL-E-22200) enables government to tell contractors what kind of electrodes they must use in one or two printed pages compared with the 20 or 30 required three years ago. Studies leading to its adoption took three years of joint effort by the Bureau of Ships and National Electrical Manufacturers Association.

## Lead-Zinc Bill Vetoed by 'Ike'

President Eisenhower vetoed H. R. 8860, the small lead-zinc miner stabilization program. The bill would induce mines to reopen, thus causing lead-zinc prices to fall, and it would bring about demands from other minerals industries for like treatment. The President also noted that Congress had not appropriated enough money to run the subsidy program.

## Japan Is Good Equipment Market

Jack Kleinoder (center), general manager, Volkert Stampings Inc., Queens Village, N. Y., chats with Yoshiza Murata (left) managing director, Murata Textile Machine Co., Kyoto, Japan. Mr. Kleinoder says Japan offers a tremendous market for high quality, U. S. machine tools and production equipment. To tap the market, he says U. S. companies should send their best sales engineers to Japan for prolonged periods to show the Japanese where and how to use the modern U. S. equipment.

## Hourly Wage Earner: 6.9 Cents Richer in Cleveland

Since the first of the year in the Cleveland area, 151 separate wage settlements covering 43,185 hourly paid production workers have been made. The average increase: 6.9 cents, excluding fringes. The Associated Industries of Cleveland, which conducted the survey in the diversified industrial area, found that 28 companies offer cost of living escalations in their contracts. Here are the statistics:

| Number of Settlements | Employment Group | Total Employment | Average Wage Increase (cents) |
|---|---|---|---|
| 29 | 1-49 | 755 | 7.28 |
| 31 | 50-99 | 2,097 | 6.41 |
| 49 | 100-499 | 8,510 | 6.33 |
| 32 | 500-999 | 6,693 | 6.29 |
| 10 | 1000-over | 25,130 | 7.25 |

## GE's 'Phantom' Signal Offers Military Security

Field tests over congested communications areas with its new "Phantom," broad band, signal system have been successful, says General Electric Co. Developed by the Heavy Military Electronics Dept., Syracuse, N. Y., the

signal offers immunity from jamming, transmission security, and message security. (On conventional receivers, the signal sounds like ordinary static.) Applications are seen for aircraft and satellite communication systems.

## Engineer Wants Traffic Cops for Space

Peter R. Dax, Westinghouse Electric Corp. radar engineer, is calling for a world-wide satellite tracking and cataloguing system. He expects to see about 1000 manmade objects in orbit within ten years, says it seems inevitable that some will be weapon carriers, so it becomes necessary to know precisely the identity and location of every one. He proposes a monitoring system of seven radar installations around the earth, with a computer at each site linked to a central station that would evaluate the information.

## Straws in the Wind

In the period 1960-75, the relative influence of the U. S. and Russia in international affairs will decline as the relative influence of third, fourth, and fifth nations and nation groups (Communist China and Western European nations) grows, says Dr. George L. Haller, vice president, General Electric Co., and general manager of its Defense Electronics Div. . . . St. Lawrence Seaway officials see a trend developing: Fewer, but larger and more heavily laden vessels on the waterway this season. Tonnages for the Montreal to Lake Ontario section are up 12.8 per cent; Welland Canal cargo is up 17.1 per cent . . . Automatic wage increases have gone into effect for 340,000 hourly rated General Motors Corp. employees and 107,000 Westinghouse Electric Corp. workers. GM employees received 6 cents an hour increase, similar to those hikes in each of the last two years under the company's current agreement with several unions. Westinghouse workmen received either 1 cent an hour more or 0.5 per cent of 1955 base rates due to the rise in the cost of living index announced Aug. 25 . . . Vitro Minerals Corp. has executed an exploration loan agreement with the Department of the Interior for work on its new beryllium property in the Topaz Mountain area of Juab County, Utah . . . Except for minor details, Phoenix Steel Corp., New York, has concluded negotiations to purchase the Claymont, Del., plant of Colorado Fuel & Iron Corp.

# Metalworking Pulse

**The Business Trend:** Slight downturns in power output, steel production, and carloadings dropped STEEL's industrial production index 1 point despite the fact auto output strengthened. However, Labor Day is traditionally a turning point. A moderate upturn by midmonth is expected. **Autos:** All makers are expected to be producing '61s by the end of this week. **Steel:** Production dropped to 1,441,000 tons in the Labor Day week, a new low since the July 4 holiday.

- **INDUSTRIAL PRODUCTION**
  Week ended Sept. 3 .... **144†**
  Year ago ..... **109**
  Details on Page 99

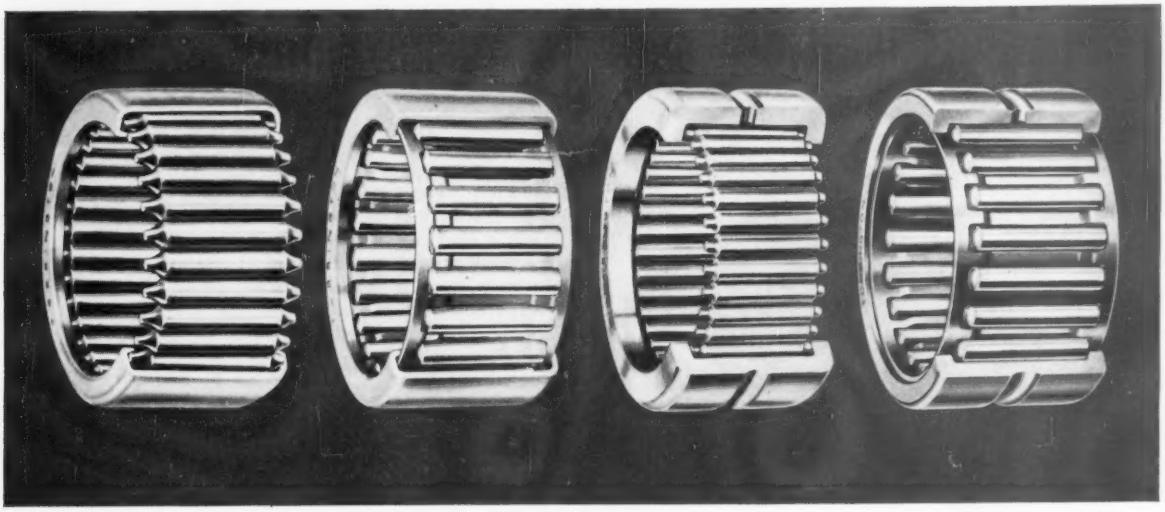
- **PASSENGER CAR PRODUCTION**
  Week ended Sept. 10 **60,000***
  Year ago ..... **24,364**
  Details on Page 95

- **INGOT PRODUCTION RATE**
  Week ended Sept. 11 **50.6%†**
  Week ago ..... **52.0%**
  Details on Page 180

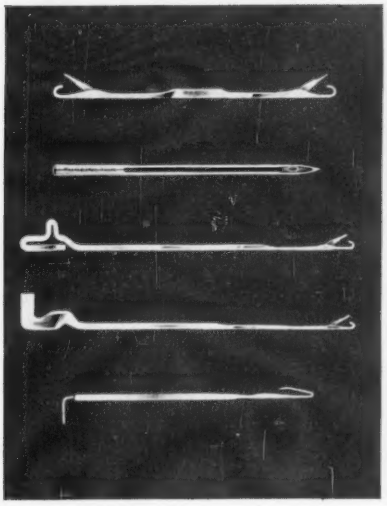
†Preliminary. *Estimated.


Copyright 1960 by STEEL, Penton Building, Cleveland 13, Ohio

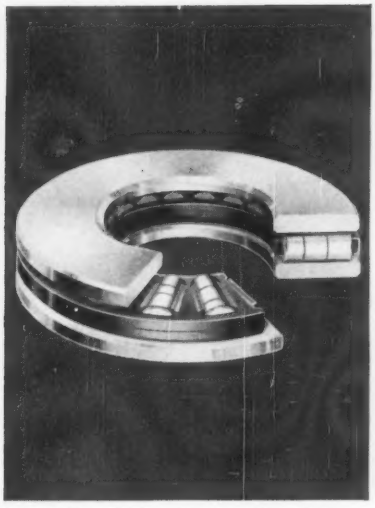
# ONLY TORRINGTON MANUFACTURES ALL FOUR OF THESE REVOLUTIONARY NEEDLE BEARINGS...



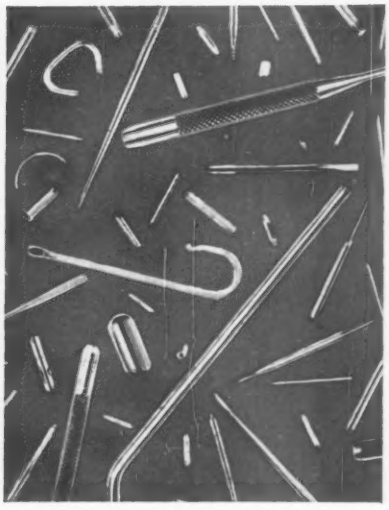
## THIS, TOO, IS TORRINGTON



America's largest maker of precision-made machine needles for knitting, sewing, felting, tufting—and a leading producer of surgeons needles.



Specialists in producing thrust bearings of every type, to meet all requirements, from small machine tools to giant radar installations.



America's leading volume manufacturer of small precision metal parts for assembly in a wide variety of industrial and consumer products.

*In these and many other fields throughout the world Torrington is contributing to*

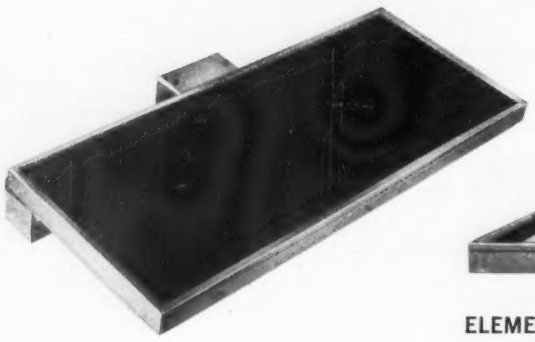
# PROGRESS THROUGH PRECISION

**THE TORRINGTON COMPANY**

Torrington, Connecticut

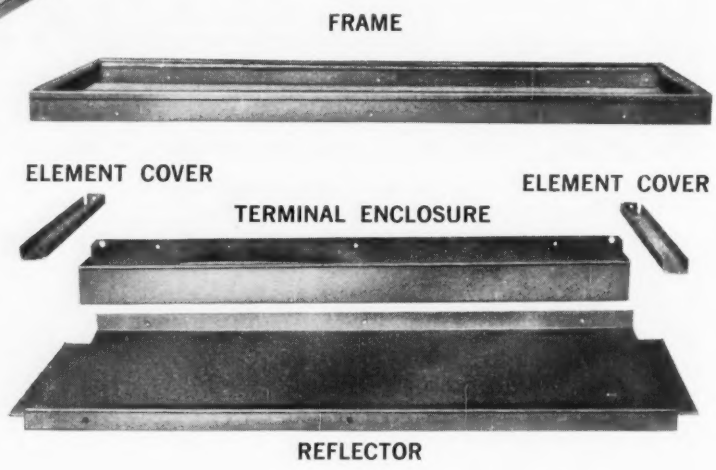
Serving industry from plants located in the United States, Canada, England, Germany and Italy

# Economical, reflective Armco ALUMINIZED STEEL gives multiple benefits in new infrared heater



COMPLETE UNIT

This new self-contained infrared heating unit is used for drying, baking, curing, and preheating. The heating element is tempered glass coated with an electrically-conductive film. The long-wave-length heat given off is readily absorbed by materials of all colors. All major metal parts—reflector, frame, terminal enclosure and element covers—are made from Armco ALUMINIZED STEEL Type 1.




This new self-contained infrared heating unit heats quickly and uniformly, requires minimum maintenance, remains permanently strong—yet is built at reasonable cost. The reason: nearly everything except the glass is fabricated from Armco ALUMINIZED STEEL Type 1.

## Add these features to your products

**1. Heat reflectivity**—ALUMINIZED STEEL bounces back about 80 per cent of radiant heat that meets it.

**2. Strength**—Because they are steel-strong, units remain rigid at operating temperatures even when they are made from lighter gages than are required with softer heat-reflective metals.

**3. Rust-resistance**—A special aluminum coating that guards against corrosion.

**4. Reasonable cost**—Light-gage strength means material savings; elimination of painting speeds production and lowers costs.

Investigate the unique advantages of this material for your products today. Just call the nearest Armco Sales Office or fill in and mail the coupon.

New steels are born at Armco

**ARMCO STEEL CORPORATION**
2620 Curtis Street
Middletown, Ohio

Send me the catalog, **Armco ALUMINIZED STEEL Type 1.**

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

# ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

# Nation on a Tiger!

"The people of the United States are in a sense becoming a nation on a tiger.

"They must learn to consume more and more, or, they are warned, their magnificent economic machine may turn and devour them.

"They must be induced to step up their individual consumption higher and higher, whether they have any pressing need for the goods or not.

"Their ever expanding economy demands it."

That is the gist of *The Waste Makers*, a new book by the author of the controversial best sellers, *The Hidden Persuaders* and *The Status Seekers*.

In Mr. Packard's opinion, labor practices have become part of this pattern of wastefulness. Many workingmen, he says, show more concern for featherbedding, gold bricking, or collecting "rocking chair" compensations than they do for developing a standard of workmanship that is worthy of pride.

Those forms of wastefulness, Mr. Packard concludes, stem from our fantastic productivity.

To cope with it, he contends, industry promotes new sales by dreaming up new or improved products, or products that at least seem new or improved.

We agree that this nation may be riding a tiger, but, in our opinion, it doesn't look anything like the one Mr. Packard describes.

His theory of production and consumption seems to repeal the law of supply and demand and leads him to a surprising conclusion—that our basic problem is "fantastic productivity." We're also puzzled by the conclusion that such productivity encourages wasteful labor practices.

We would describe our tiger this way: We need more productivity, not less, as implied by Mr. Packard.

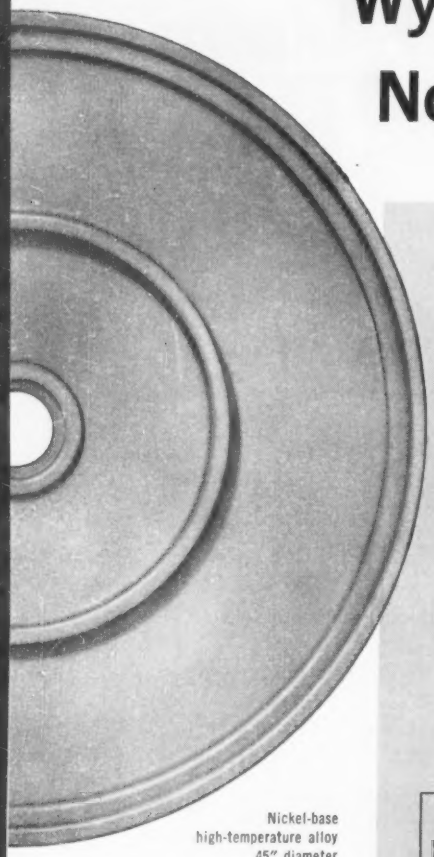
By productivity we mean the efficient use of men and machines that enables us to turn out a quality product at the lowest possible price.

We're sure that the thousands of metalworking managers now attending The Machine Tool Exposition—1960 at Chicago agree with us.

Irwin H. Such

EDITOR-IN-CHIEF

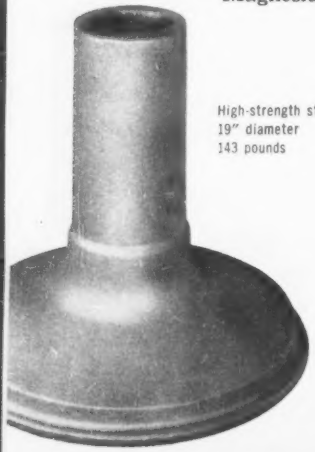
# Wyman-Gordon makes a major
# Now parts are being forged in



Nickel-base
high-temperature alloy
45" diameter
520 pounds

## BROAD RANGE OF GAS TURBINE COMPONENTS ALSO BEING PRODUCED IN:

- Low-Alloy, High-Strength Steels
- Intermediate-Temperature Alloys
- Titanium and Refractory Metals
- Aluminum and Magnesium



High-strength steel
19" diameter
143 pounds

## PHYSICAL PROPERTIES

| | ALLOY* | TEST TEMPERATURE °F. | HEAT TREAT | GUARANTEED MINIMUM ULTIMATE TENSILE STRENGTH PSI | GUARANTEED MINIMUM 0.2% YIELD STRENGTH PSI | GUARANTEED MINIMUM ELONGATION % | TYPICAL VALUES ULTIMATE TENSILE STRENGTH PSI | TYPICAL VALUES 0.2% YIELD STRENGTH PSI | TYPICAL VALUES ELONGATION % |
|---|---|---|---|---|---|---|---|---|---|
| TENSILE AND YIELD STRENGTHS | Waspaloy | RT | A | 175,000 | 120,000 | 15.0 | 194,000 | 136,000 | 24.0 |
| | | 1000 | A | 162,000 | 112,000 | 13.0 | 175,000 | 124,000 | 23.0 |
| | René 41 | RT | B | 180,000 | 132,000 | 12.0 | 200,000 | 150,000 | 15.0 |
| | | 1400 | B | 135,000 | 115,000 | 13.0 | 145,000 | 125,000 | 18.0 |
| | Astroloy | RT | C | 190,000 | 138,000 | 10.0 | 205,000 | 152,000 | 12.0 |
| | | 1400 | C | 150,000 | 122,000 | 12.0 | 160,000 | 132,000 | 15.0 |
| | U-500 | RT | D | 175,000 | 120,000 | 10.0 | 195,000 | 135,000 | 12.0 |
| | | 1400 | D | 125,000 | 105,000 | 12.0 | 140,000 | 120,000 | 15.0 |
| | M-252 | RT | B | 170,000 | 115,000 | 15.0 | 185,000 | 125,000 | 20.0 |
| | | 1000 | B | 160,000 | 105,000 | 15.0 | 165,000 | 115,000 | 22.0 |

| | ALLOY* | TEMPERATURE STRESS | GUARANTEED MINIMUM | TYPICAL VALUES |
|---|---|---|---|---|
| STRESS RUPTURE | Waspaloy | 1350°F.—70,000 psi | 70 hours—6% Elongation | 130 hours—16% Elongation |
| | René 41 | 1350°F.—85,000 psi | 30 hours—8% Elongation | 60 hours—15% Elongation |
| | Astroloy | 1800°F.—20,000 psi | 20 hours—7% Elongation | 35 hours—12% Elongation |
| | Udimet 500 | 1650°F.—25,000 psi | 30 hours—6% Elongation | 55 hours—12% Elongation |
| | M-252 | 1500°F.—40,000 psi | 30 hours—8% Elongation | 55 hours—16% Elongation |

NOTE: The guaranteed minimums are based upon radial and tangential test locations.

## COMPOSITION AND HEAT TREATMENT

| | ALLOY* | ELEMENTS C | Cr | Mo | Co | Ti | Al | B | Ni |
|---|---|---|---|---|---|---|---|---|---|
| CHEMISTRY | Waspaloy | .08 | 19.0 | 4.3 | 13.5 | 3.0 | 1.4 | .004 | Balance |
| | René 41 | .08 | 19.0 | 10.0 | 11.0 | 3.1 | 1.6 | .004 | Balance |
| | Astroloy | .05 | 15.0 | 5.0 | 15.0 | 3.5 | 4.3 | .030 | Balance |
| | Udimet 500 | .07 | 18.5 | 5.0 | 18.3 | 3.0 | 3.0 | .003 | Balance |
| | M-252 | .15 | 20.0 | 10.0 | 10.0 | 3.0 | 1.3 | .002 | Balance |

| | | |
|---|---|---|
| HEAT TREATMENT | A. | 1850°F.—4 hours—OQ; 1550°F.—2 hours—AC; 1400°F.—16 hours—AC |
| | B. | 1950°F.—4 hours—AC; 1400°F.—16 hours—AC |
| | C. | 2100°F.—½ hour—AC; 1400°F.—16 hours—AC |
| | D. | 1975°F.—4 hours—AC; 1500°F.—24 hours—AC; 1400°F.—16 hours—AC |

NOTE: Refer to appropriate heat treat code in Tensile & Yield Strength table.

*Waspaloy: Pratt & Whitney Aircraft Corp.; René 41, Astroloy and M-252: General Electric Company; Udimet 500: Metals Division, Kelsey-Hayes Company.

# contribution to gas turbine progress . . . these new Superalloys with Guaranteed Minimum Properties

permits designing to higher operating stresses . . . increased efficiency . . . greater component reliability for every gas turbine application

Rapid progress in developing the gas turbine has materially extended application of this prime power source to areas other than aircraft. Significant contributions in forging techniques and metallurgical advancements by Wyman-Gordon have in part made this possible.

Now designers are free to explore new frontiers of turbine performance unhampered by former material limitations. The high temperature alloys shown here exhibit outstanding tensile and stress rupture strengths in elevated temperature environments. These alloys have been forged into discs, shafts, rings, blades and vanes on a production scale.

Wyman-Gordon offers these alloys to *guaranteed minimum properties* for such vital components. This is made possible by the broad experience in forging parts from all difficult-to-work materials, including a complete range of low-alloy, high-strength steels; intermediate-temperature alloys; light metals; titanium and the refractory materials.

Our metallurgists and forging engineers are prepared to counsel on turbine components . . . evaluating material requirements and forging of existing designs and development parts. For assistance or additional information on Superalloy forgings, write—Product Manager, Turbine Applications, Wyman-Gordon Company, Worcester, Massachusetts.

**WASPALOY**

**RENÉ 41**

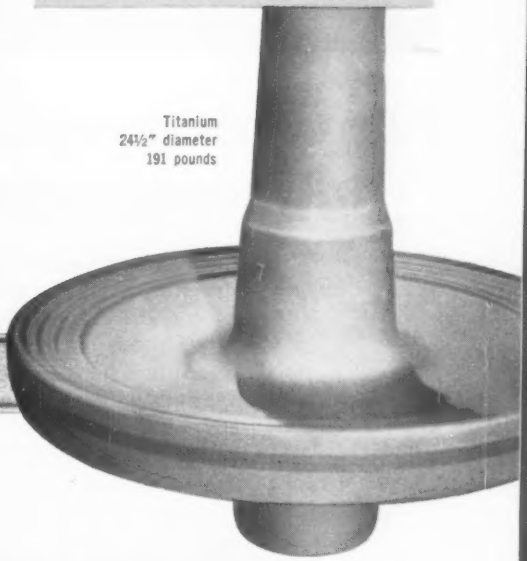
**ASTROLOY**

**UDIMET 500**

**M-252**

## MEETING DESIGNERS' NEEDS IN EVERY TURBINE APPLICATION

- Aircraft and Missile
- Nuclear Power and Propulsion
- Rail and Highway Transport
- Power Generation
- Air Supply and Pumping
- Pipeline Boosting
- Auxiliary Service
- Automotive
- Marine Propulsion
- Stationary Power



EST. 1883

FORGED

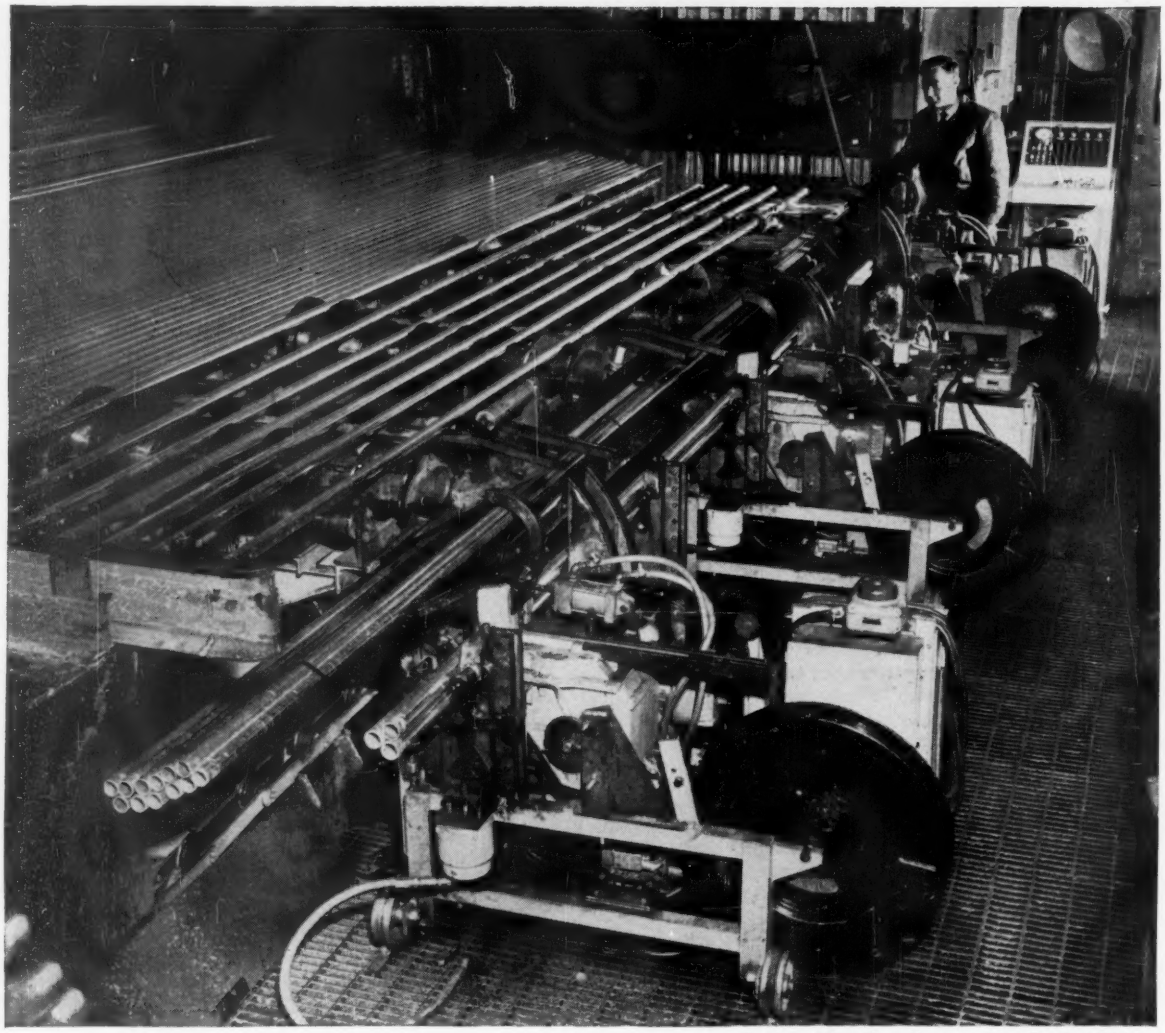
# WYMAN-GORDON

## FORGINGS

*of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials*

HARVEY ILLINOIS · WORCESTER MASSACHUSETTS · DETROIT MICHIGAN

GRAFTON MASSACHUSETTS · LOS ANGELES CALIFORNIA · PALO ALTO CALIFORNIA · FORT WORTH TEXAS



Courtesy of Blaw-Knox Company, Aetna-Standard Division

# New Signode machines bundle pipe in seconds

Three synchronized Signode Model MS2BR power strapping machines are at work here. They automatically apply three straps per bundle. With these machines, it is now possible to keep ahead of the production of high speed pipe mills. Uniformly tight bundles are produced.

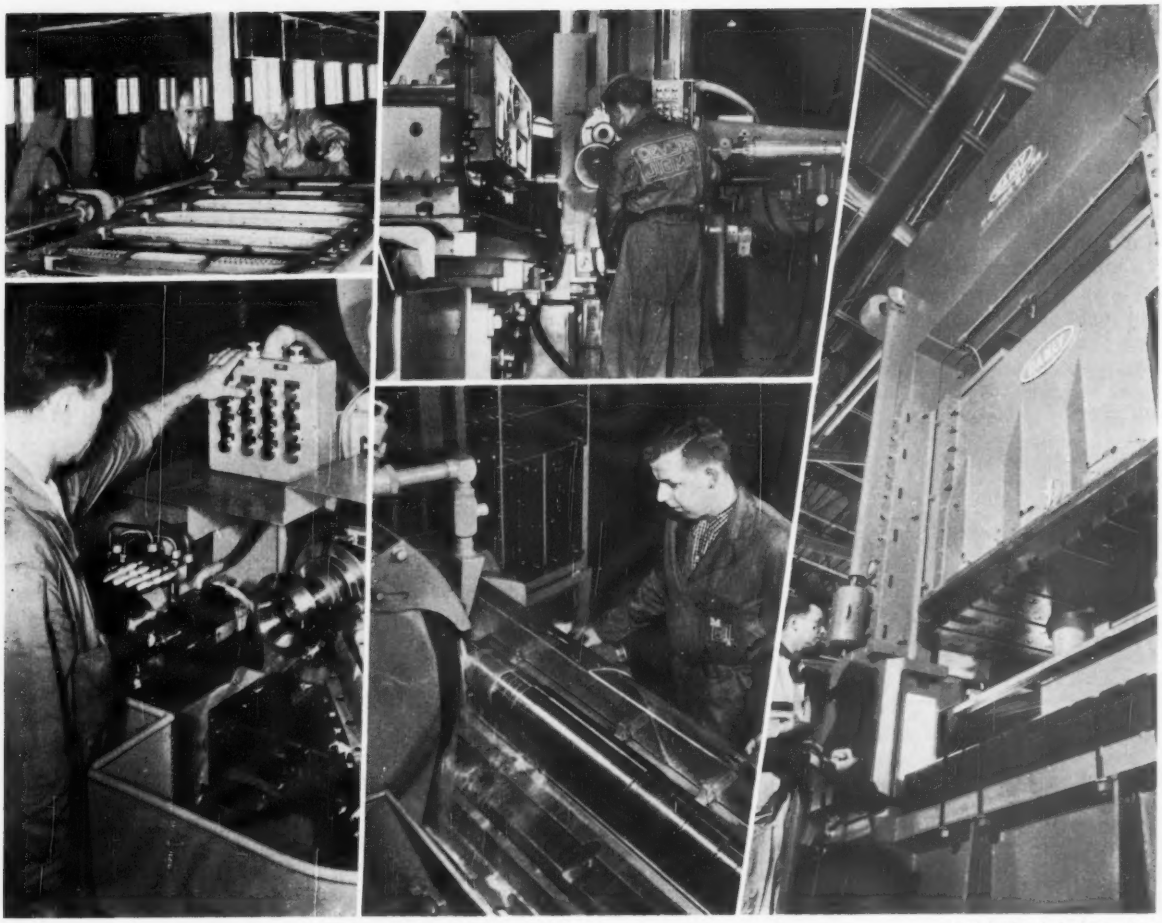
Similar Signode power strapping machines for pipe bundling have been proved dependable in more than six years of pipe mill service. They are ideal for strapping electrical metallic tubing and rigid conduit, as well as pipe. Write for more information about these machines or this installation. Signode counsel is available to help you work out a strapping installation that meets your requirements, no matter what your product. No obligation. Just write:

*First in steel strapping*

**SIGNODE STEEL STRAPPING CO.**

2645 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto



Hill & Knowlton of Cleveland

**THE MACHINE TOOL EXPOSITION – 1960**

# Will It Spur Capital Spending?

THAT QUESTION is uppermost in the minds of equipment builders displaying their wares in Chicago.

By the end of this week, it is estimated that more than 100,000 metalworking managers will have toured the sometimes sweltering, always crowded exhibits. Last Tuesday, opening day, more than 12,000 paid their way into The Machine Tool Exposition—1960 at the Amphitheatre. Heavy attendance figures were also chalked up at the 1960 Production Engineering Show at Navy Pier and the 2nd Coliseum Machinery Show at the Coliseum.

Visitors are finding that, no matter what kinds of machines they came to see, they can find them in abundance. One, representing an Illinois tractormaker, told STEEL: "A team of 14 of us came here to study the wide variety of numerically controlled machines displayed. We're still studying them. But at a meeting we had downtown Wednesday night, we found we have five other machines that we'll include in an equipment buying proposal we're preparing."

John Blue, president, John Blue Co., Huntsville, Ala., commented: "We're a small (200 employees) producer of farm equipment. Our primary needs are for small, standard, manually operated equipment. That's what I came to see. But I've already been impressed with the tremendous advances of tracer control since I was here five years ago. We'll certainly have to give them more consideration."

Said E. R. Faust, works manager, Allen Mfg. Co., Bloomfield, Conn.: "Five of us will spend a full week here—we are primarily interested in cold forming and thread rolling. We didn't expect to see much in cold

forming but we hoped there would be significant advances in thread rolling. We haven't been disappointed. The manufacturers have shown us a capability for rolling at much higher speeds and for rolling larger diameters. Of course, we came to get educated on numerical control."

• **Supermarket Variety**—Proprietors of ten-man plants, and executives of multiplant corporations could find equipment to fit their needs and their budgets. The elephant tools include a towering Danly Machine Specialties Inc. press 24 ft high, weighing 75 tons, and costing about $150,000.

A two-ram, vertical turning and boring machine in the booth of Elmes/King Div., American Steel Foundries, weighs 110 tons, fits up between the 23 ft high rafters of the hall. It has a 10 ft diameter table. Price tag: About $150,000.

On the other hand, a power hacksaw, made by Armstrong-Blum Mfg. Co., sells for $225. (Another in the same booth sells for $20,000.)

In the Kearney & Trecker Corp. booth are 18 milling machines. Price range: From $10,000 for a plain milling machine to $150,000 for a tape guided, automatic tool change, Milwaukee-Matic.

Hamilton Tool Co. shows a small, supersensitive, drilling machine that costs only $400.

An automatic combination of machines in the Landis Tool Co. booth grinds all of the line and pin bearings on automotive crankshafts. The line is in the $225,000 price class.

Heald Machine Co. has a No. 0, horizontal, precision boring machine it designed and built to sell for about 35 per cent less than any other machine of similar capacity.

For the first time, major manufacturers of grinding machines are offering numerically controlled plain grinders. Cincinnati Milling Machine Co. has a tape control for table and wheel head position on its 18-in. by 72-in. plain grinder. Landis Tool Co. uses a Warner & Swasey Probomat on its 6-in. R plain grinder. It has an automatic sizing gage (set by the tape) that reads size in the part being ground.

• **Balanced Interest**—On the eve of the show, several builders confided they were afraid numerical control might be so glamorous as to take attention away from less spectacular but equally significant improvements in standard machine tools.

"Not so," one visitor (his company has plenty of interest in numerical control) told STEEL. "But remember," he adds, "numerical control still accounts for only about 1 machine in every 10 here at the Amphitheatre. Also, we've got to look for solutions to some stamping, forging, and other problems where tape can't help us."

• **Reaction Will Tell**—Builders now begin their wait to see how users react to the new machines. It will probably be a year before full im-

## *Tool Salesmen Aim at Top Management*

**GEORGE C. MERRYWEATHER** is the new president of the American Machine Tool Distributors Association. He is president of Merryweather-Strasmann Machinery Co., San Mateo, Calif.

MANAGEMENT can expect to hear more from machine tool salesmen than they have in the past.

J. Russell Clark, outgoing president, American Machine Tool Distributors Association, told his organization last week: "Our industry has too long dealt with salesmanship on the shop level. This was fine when we were dealing with the same old problem in the same old way. But, today, the situation is different. We have to start selling the philosophy of productivity —not expansion, not replacement, but greater economic value per customer dollar."

Mr. Clark (president, White Star Machinery & Supply Co., Wichita, Kans.) is convinced that such selling must be done at the top level. "We have to start getting management interested in the idea that unless their plant is truly modern, they won't stay in business long."

• **Clarion Call**—Mr. Clark feels the challenge the U. S. is getting from its foreign competitors means we must achieve a good rate of growth in productivity.

He laments the fact that, although some portions of the economy, such as gross private domestic investment, are on the way up, the investment in producers' durable goods is not keeping pace. He challenged the machine tool salesmen to tackle the problem with an all-out effort in selling the importance of productivity.

pact of the show can be measured. As of now, the builders themselves feel the 1960 exposition is both the biggest and best they have ever had.

Alan C. Mattison, president, Mattison Machine Works, and president, National Machine Tool Builders' Association (sponsor of the Amphitheatre exposition) says: "In case after case these new machines will do a job in a half, a third, or even a fiftieth of the time formerly required. Never have advances in machine tool design and operation been so rapid as in the five years since our last machine tool exposition."

# Plant, Equipment Spending Could Hit $36.4 Billion

ESTIMATES of 1960 spending by business for new plant and equipment have been revised downward by the Securities & Exchange Commission of the Department of Commerce. The Commission's latest quarterly survey sees such spending at $36.4 billion compared with $32.5 billion in 1959. Earlier predictions put spending 2 percentage points above the latest estimate.

Revised increases were broken down this way: Durable goods industries, up 21 per cent; nondurable goods industries and railroads, up 16 per cent each; mining, up 6 per cent; transportation other than rail and public utilities, up 4 per cent each; commercial and other, up 8 per cent.

## 1960 Spending for New Plant and Equipment

(Seasonally adjusted at annual rates in billions of dollars)

| | First Quarter | Second Quarter | Third Quarter | Fourth Quarter |
|---|---|---|---|---|
| **Manufacturing** | $14.1 | $14.7 | $14.6 | $14.8 |
| **Durable goods** | 7.15 | 7.4 | 7.3 | 7.3 |
| **Primary iron & steel** | 1.6 | 1.6 | 1.6 | 1.6 |
| **Primary nonferrous** | 0.3 | 0.3 | 0.4 | 0.4 |
| **Electrical machinery** | 0.6 | 0.65 | 0.7 | 0.7 |
| **Machinery (except electrical)** | 1.15 | 1.15 | 1.1 | 1.2 |
| **Other** | 3.5 | 3.7 | 3.5 | 3.4 |
| **Nondurable goods** | 6.95 | 7.3 | 7.3 | 7.5 |
| **Mining** | 1.0 | 1.05 | 1.1 | 1.1 |
| **Railroad** | 1.0 | 1.1 | 1.1 | 1.0 |
| **Transportation (except rail)** | 2.0 | 2.15 | 2.2 | 2.2 |
| **Public utilities** | 5.75 | 5.7 | 6.0 | 6.1 |
| **Commercial & other** | 11.35 | 11.6 | 11.9 | 11.9 |
| **Total** | $35.15 | $36.3 | $36.9 | $37.1 |

Source: Commerce Department.

# GE, Westinghouse Make Union Offers

SIMILAR CONTRACT offers have been made to employees of General Electric Co. and Westinghouse Electric Corp. The three year contract packages included wage increases, liberalized benefits, and proposals to cover job opportunities and layoffs.

International Union of Electrical Workers officials called the GE proposal "meager and unrealistic" and termed the Westinghouse offer a "bad carbon copy."

The IUE, which is setting the pace in negotiations with both GE and Westinghouse, has demanded a minimum 3½ per cent increase tied to increases in workers' productivity and to the cost of living index.

GE offered employees an immediate 3 per cent wage increase and a 4 per cent hike in April, 1962. Westinghouse's wage offer ranged 4 cents (to workers making $1.68½) to 11 cents (for workers making over $3.77) plus incorporating the current cost of living increment into the base wage rate. A second raise ranging from 5 cents to 14 cents was offered starting Apr. 16, 1962.

The job opportunity and layoff proposals from the two firms were nearly parallel:

- Qualified employees facing layoff to be retained for other work at a pay rate equaling 95 per cent of the job rate for the old job disappearing temporarily or permanently.
- A three choice plan for drawing layoff or termination payments equal to one-week's pay for each year of service for an employee with a tenure of at least three years.

Westinghouse's offer included 18 improvements in the amount and duration of life insurance, hospital, surgical, and accident insurance, and medical coverage. Effective Oct. 17, 1960, the monthly pension benefit for each year of service prior to 1956 would be upped to $2.25 from the present $2. On Apr. 2, 1962, pension benefits would be increased to $2.40 for each year of past service. Normal retirement benefits for service after Apr. 2, 1962, would range from $2.50 to $3.50 for each year of service.

**DOWN TO THE SEA**

# New World for Industry to Conquer

"WE KNOW MORE about the Moon's behind that we do about the ocean's bottom."

That quip by an oceanographer points up a growing realization by Congress, the White House, the military, and all branches of science that we must spend close to $1 billion in the next ten years to give us a world position in oceanography (the study of the ocean's geography and related matters).

Much of the push is coming from the Navy's antisubmarine warfare program. Industry's stake in the project is expressed this way by Dr. James E. Lipp, corporate director, development planning, Lockheed Aircraft Corp., Burbank, Calif.: "Surely . . . many peacetime commercial and industrial activities which will gain impetus from the Navy's program . . . perhaps the next step in undersea mining will be to recover manganese and cobalt . . . "

• **What's Down There**—The National Academy of Sciences-National Research Council, Washington, reports heavy metals of economic importance "are incorporated in disorganized layers of ferromanganese minerals" on the ocean bottoms. Manganese has been identified in concentrations of 10 to 47 per cent, while cobalt, copper, nickel, and rare earths occur in concentrations of 0.1 to 1 per cent. The concentrations, called nodules, range in diameter from 1 millimeter to more than a meter. They are believed to cover 50 million square kilometers of the Pacific Ocean and may be in large areas of the Atlantic and Indian Oceans.

Sea water itself is literally loaded with minerals and chemicals. Each cubic mile of sea water, says the International Oceanographic Foundation, Coral Gables, Fla., contains 18 million tons of magnesium, plus large quantities of sodium, sulfur, calcium, potassium, bromine, chlorine, and dissolved salts of gold, silver, aluminum, radium, nickel, iron, chromium, and uranium.

Example of what can be done: The Grand Isle Sulphur Mine in the Gulf of Mexico, operating from an elaborately equipped steel tower, will soon be piping a hot, sulfur bearing liquid 7 miles to shore. Magnesium and bromine are largely obtained from sea water via processes perfected during World War II.

• **Other Possibilities**—Dr. John L. Mero, University of California, Berkeley, Calif., predicts manganese can be mined from the ocean floor nodules at a cost of $3 to $5 a ton. Another possibility: Cesium, which is found in the ashes of certain seaweeds. It's needed to power ion rocket engines for space exploration.

Scientists guess there are 25 tons of gold per cubic mile of sea water. Dr. Roger Revelle, director, Scripps Institution of Oceanography, University of California, Berkeley, estimates at least $500,000 worth of minerals are contained in each square mile of ocean floor.

• **What Industry Is Doing**—Because of its primary concern about the submarine menace, the Navy is increasing its budget for basic research in oceanography. Its efforts have direct benefits to metalworking in the equipment and research contracts awarded, plus the indirect

benefit of bringing more knowledge to the surface.

Leading Navy contractors are doing important work. For example, Stromberg-Carlson Div., General Dynamics Corp., has the largest sonar test tank in the world at Rochester, N. Y. Martin Co., Baltimore, is into deep water sound research. Raytheon Co. is building the first fully integrated sonar center at Portsmouth, R. I. Aerojet-General Corp., Azusa, Calif., is a specialist in underwater engines. Lockheed is converting the *USS Snatch* into an oceanographic research vessel for Scripps Institution. At Pompano Beach, Fla., U. S. Industries Inc. has developed mechanical research instruments like grappling systems, deep unmanned submersibles, deep coring devices, and constant tension winches.

Reynolds Metals Co., Richmond, Va., is designing and building the *Aluminaut*, a maneuverable, aluminum vehicle that man can take down to 15,000 ft. The Office of Naval Research is considering a proposal to lease it to the Woods Hole Oceanographic Institution, Woods Hole, Mass., for research.

• **Spending Program**—The Navy's fiscal budgets for basic and applied oceanographic research are on the increase:

| | |
|---|---|
| 1959 | $ 9,391,000 |
| 1960 | 13,886,000 |
| 1961 | 17,724,000 |

These figures do not include funds categorized as applied military research ($10 million in fiscal 1961) and such closely related areas as Arctic and coastal geographic research ($2 million in fiscal 1961). Related shipbuilding is not included either. The broadest way to look at the Navy in this field is through its $1.4 billion appropriation for anti-submarine warfare this fiscal year.

The Navy accounts for less than half the government's spending in the field. Almost $56 million has been O.K.'d to such agencies as Commerce, Interior, and Health, Education & Welfare, the National Science Foundation, Atomic Energy Commission, and the Navy.

Fiscal 1961 figures compare with what has been recommended as the beginning of the new look in oceanography: The National Academy of Sciences thinks $88 million should be spent; the Interagency Committee on Oceanography recommends $120 million.

• **On Capitol Hill**—The sea, which represents 71 per cent of the earth's surface, is daily becoming more impressive to Congress. The submarine threat has called forth rapid increases in our Polaris program; the USSR is known to have accelerated its oceanographic research for economic as well as military reasons. The propaganda value of achievement must also be taken into account.

Legislation of the broadest nature will be passed. Bills call for implementation of a ten year program recommended by the National Academy, fostering the training of more oceanographers (we have about 300), checking the disposal of radioactive material in the sea, co-ordinating the work of the many government agencies in the field, and establishing a national research center.

• **Metalworking's Place**—Any company can find its place in oceanography. The equipment needed for the research is complicated but often doesn't require the technology of spacework, where heat is such a problem. Pressure probably is the biggest technological problem, but better steels (perhaps aluminum and titanium) for structural materials will solve it.

Dr. Lipp foresees cargo submarines, perhaps a tractor-trailer, extensive undersea pipelines, and tunnels, such as the one proposed under the English Channel. Other needs include: Underwater laboratories, improved shore facilities for data handling, better surface ships, instrumented buoys, survey aircraft, and all sorts of special devices for remote handling and grappling.

Scripps scientists have used a vacuum dredge (capable of raising nodules 1 ft in diameter 1000 ft) to bring up samples. One dredge has brought up 500 lb of small nodules at 4000 ft. Oceanographers figure 1 square mile of ocean floor might yield 6000 tons of manganese, 4000 tons of iron, and 125 tons of nickel, copper, and cobalt.

**This remote control undersea vehicle is a converted tank equipped with a jointed manipulator arm and hand. Television cameras serve as the eyes for the vehicle's operator on shore. It's one example of equipment needed for studying the ocean's bottom**

### *What a Private Sales Firm Can Offer:*

John Rogers, president, Stamco Sales Inc., feels these are important:

1. A hard hitting team of specialists (no trainees) who devote all their efforts to the sales function.
2. A controlled sales cost setup on a strict commission basis.
3. Increased quantity and quality of inquiries with sales potential.

# Stamco Tries New Sales Approach

HERE'S A NEW approach to the old sales enigma of "shall we sell through our own salesmen, independent distributors, or manufacturers' representatives?"

Stamco Inc., New Bremen, Ohio, maker of coiling, slitting, and shearing equipment, turned over its total sales job to an independent firm, Stamco Sales Inc., early this spring. Objective: To play up the advantages of a home-owned sales team, yet retain the advantages of determining sales costs on a strictly commission basis.

Stamco Sales was organized by five professional salesmen—each with a background of ten or more years in sales or design of the type of equipment Stamco Inc. produces. The sales firm has headquarters in Cleveland and offices in Chicago, Detroit, and Chatham, N. J.

How does the sales function of a private company differ from that of a firm with its own sales team? In theory of operation, probably not much, John Rogers, president, Stamco Sales, points out. The basic differences show up in the practical day to day activities.

• **Operates as Catalyst**—"We're the catalyst between the customer and Stamco," explains Mr. Rogers. In effect a sale works like this:

1. "The customer has a problem. We contact him, appraise the problem to determine whether the equipment we sell is practical to do the job. If it is, we recommend the best approach and types of equipment necessary.
2. "We submit a proposal to Stamco which says, in effect, we can sell this equipment if you can make it at a price attractive to the potential customer.
3. "Stamco then replies: 'Yes, we can do the job. It'll cost this much and take this long to deliver.' "

• **Avoiding the Overlap**—"Our arrangement with Stamco," emphasizes Mr. Rogers, "insures a relationship between the sales function and those of engineering and manufacturing that most firms strive for but have difficulty in achieving because of human hazards built into any organization."

Examples of the human hazards: Local politics; day to day "fire fighting" of a myriad of minor problems that can consume too much time of sales, engineering, and manufacturing personnel; time lost by the same personnel in such efforts as trying to sell an idea (salesman to engineer or vice versa) to gain a favor for a customer, or trying out a new design.

"While the relationship between the sales company and the producing firm is on a strictly formal basis —president to president—both sides lean over backward to be considerate of each other's problems," stresses Mr. Rogers. "When problems develop in such things as manufacturing schedules or customer priorities, they are worked out by Stamco's president and myself."

• **Results to Date**—How is the arrangement working out? "It's a little too early to get specific," com-

ments Lee Harmony, Stamco Inc.'s president. "But these factors can be pointed out:

• "Both the quantity and quality of the inquiries we get have been increased. We formerly sold through a network of sales representatives and machinery dealers. While a sales representative may have had a fair knowledge of our equipment and its applications, he also had other lines to sell and thus couldn't devote his entire energies to our products. In some instances the rep's knowledge of our equipment and function wasn't adequate enough to properly evaluate a customer inquiry. Result: Many investigations and quotations by our engineers on inquiries that had no sales potential at all. Today, 95 per cent of the inquiries we process are potential orders; under the previous setup the figure was closer to 60 per cent.

• "Our engineering capacity has been increased without additional manpower. Reason: Engineers aren't out chasing down inquiries. Stamco Sales's men are completely competent to appraise the sales potential of an inquiry and prepare a complete proposal.

• "Travel expense by our engineers has been substantially reduced.

• "Customers should develop greater confidence in us and our equipment because each of Stamco Sales's salesmen is an expert and can provide topflight consulting service.

• "So far this year we have met every delivery schedule on time."

**• Keeping Tabs on Costs** — "We feel," adds Mr. Harmony, "that our costs per sales dollar will be in line and possibly below those in our previous sales setup. Because of our strict commission setup, we know exactly what our sales costs will be at any level of business."

Other plus factors Stamco gets from Stamco Sales that couldn't be expected from independent reps or machinery dealers are week to week marketing information on business trends and ideas for new and improved equipment.

The presidents of the two firms maintain a close liaison. "There's not a week in which we don't get together at one firm or the other," says Mr. Harmony.

# Tungsten Meets Its Match

**High energy rate forming overcomes some of the problems fabricators have run into in squeezing this refractory metal into practical shapes for missiles and space vehicles, says Convair**

HIGH ENERGY forming holds promise of turning tungsten into economical missile shapes.

That's what engineers at Convair Div. (San Diego, Calif.) of General Dynamics Corp. are saying about their Dynapak machine. In addition to forging and extruding the brittle metal, the device refines grain structure, improving ductility and toughness.

Reductions in cross sectional area (45 to 1) also exceed those obtained with more orthodox methods (8 to 1). In addition, no lubricants or jacketing are needed.

**• High velocity forming breaks down large grains in tungsten parts instead of only flattening them.**

Dynapak forming velocities approach those of sound (1100 feet per second). A ram-cylinder arrangement is operated by gases at 2000 psi.

Such speeds introduce new effects within metals being formed, say Convair engineers. Metallographs show that tungsten parts forged at high velocities have fine grain structures and superior ductility and toughness.

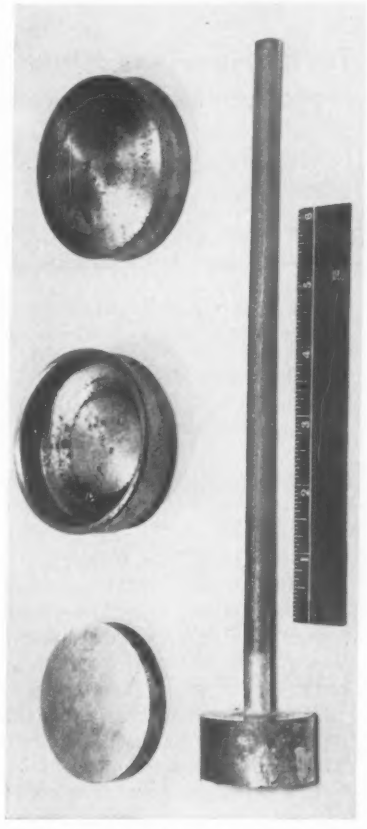
Tungsten billets are conventionally formed from powders or arc melted in a controlled atmosphere. Grains are large and brittle and weak along the boundaries.

The hot working of ordinary metals reduces grain size, improving physical properties, but high softening temperatures of tungsten (3200° F plus) have made conventional approaches impractical.

**• High forming rates ease tool wear, improve surface finishes.**

Convair formed an experimental missile part which incorporates an inside radius so small it's practically a sharp corner.

High forming rates cut wear and tear on an extrusion die. Finishes are smooth, and surface details are faithfully reproduced. One reason: Parts are in contact with dies for extremely short periods.



**Single Dynapak blow turns tungsten billet into sharp cornered cups. Extruded rod has 16:1 reduction ratio**

**• Dynapak techniques are being more widely employed to handle other refractory metals like molybdenum, columbium, and pure chromium for experimental missile parts.**

In some examples cited by Convair, the extruding feature permits formation of exceptionally long and thin ribs.

Small radiuses permit such parts to fit in tighter spaces.

# How the Tariff Hearings Are Going... Are We Protecting The Wrong Products?... Aid for Small Firms Urged

## *Tariff Hearings Highlight These Metalworker Comments . . .*

1. **The wrong sort of product has the highest tariff protection.**
2. **The least the government could do is establish realistic depreciation policies.**
3. **U. S. productivity must be three times Europe's productivity to match its low wage rates.**
4. **Industrial strides being made in India, Africa, South America will increase problems of foreign competition.**

"AN EXERCISE in futility."

"I think they are really listening."

Those contrasting opinions sum up metalworkers' reactions to their appearances before the Tariff Commission and the Committee for Reciprocity Information in recent weeks. More than 80 witnesses showed up, and 120 metalworking firms and trade associations were represented by statements submitted "for the record." The hearings are being held in preparation for the GATT (General Agreement on Tariffs & Trade) meeting which begins in Geneva this month.

Under the Trade Agreements Extension Act of 1951 (as amended), the Tariff Commission is required to investigate and report to the President on articles proposed for consideration in the GATT negotiations. How soon the commission can finish its report is anyone's guess, but sometime before the first of the year (when serious negotiations begin in Geneva) metalworkers should know the results of their testimony.

● **PLEA FOR HIGHER TARIFFS**—The hearings have not proved simply a matter of maintaining the status quo. A number of witnesses who knew that their products were to be negotiated for lower tariffs pleaded with the Commission to raise tariffs. Richard W. Elder, speaking for the Fine & Specialty Wire Manufacturers' Association, provided a good analysis of the situation (see checklist) and closed his appearance with an appeal for a return to the days of the 25 per cent tariff.

He noted that in 1930 his industry paid wages 1.7 times those in Europe and had the 25 per cent tariff. Today, the wage differential is 3 to 1, while tariff protection has shrunk to 8.5 per cent.

One of the more interesting points made at the hearings: We may be giving our best tariff protection to the wrong type of product, says Mr. Elder. Products which the U. S. can produce in quantity have inadequate protection, while materials which are in short supply in this country have extremely high tariffs. Mr. Elder cited fluorspar, manganese, and tungsten concentrates as examples of short supply materials. "We are encouraging the depletion of natural vital resources, and at the same time, injuring the industry which uses them," he said.

● **Past Concessions Prove Point**—Past negotiations with members of GATT, says the American Textile Machinery Association, prove the current arguments of metalworkers for increased tariffs, rather than lower ones. ATMA wants all textile machinery removed from the list of items to be negotiated in Geneva because imports of foreign built machines were 59 per cent above the 1958 level. GATT was directly responsible for that, says ATMA.

It had this to say about government influences on business: U. S. manufacturers must struggle with "cost factors built in by federal legislation," while a country like Great Britain is presently engaged in re-equipping its entire textile industry via the use of subsidies.

● **Foreign Competition Hurts Small Firms**—The Senate Small Business Committee has made six recommendations for softening the impact of foreign competition on small firms. Sen. Jennings Randolph (D., W. Va.) held public hearings before his subcommittee reported: 1. GATT negotiators must resist tariff cuts on products made overseas under "sweatshop" standards. 2. The President should have the power to modify decisions of the Tariff Commission. (The Supreme Court refused him this flexibility in the recent bicycle case.) 3. The federal government should do a better job of collecting and publishing statistics on import costs. 4. Negotiations should never allow the doubling or tripling of imports of a product in one year or so because the effect on the U. S. economy cannot be absorbed that fast. 5. Uncle Sam must find better ways of protecting U. S. manufacturers' patents and designs from use by overseas competitors without permission. 6. A program of readjustment aids, trade injury loans, or tax concessions should be worked out to help injured industries over the readjustment hump, when it is found that higher tariffs or quotas are not politic.

prediction

# NEVER BEFORE

SO MANY TREND-SETTING

# DEVELOPMENTS

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REPORT ON SOVIET FERROUS METALLURGY

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●

COMPLETELY AUTOMATED ROLLING MILL

●

NEW BULK GREASE-HANDLING SYSTEM

●

NEW FURNACE DESIGNS

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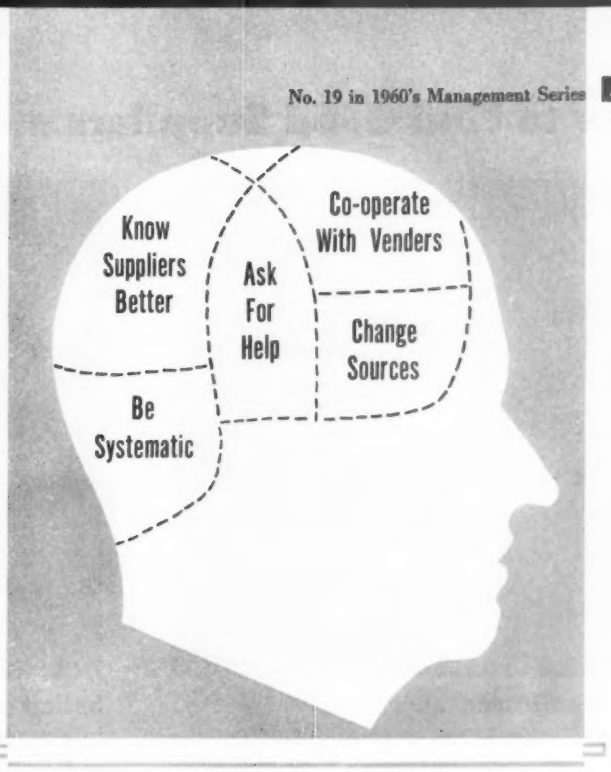

# Use Your Suppliers' Brainpower

"AMERICAN MOTORS CORP. can progress most effectively by drawing intelligently on the greater reservoir of skill and capacity built up by our suppliers. It is our intention to rely heavily on your specialization."

That's what President George Romney is telling venders of parts for Rambler cars. You may profit by taking that as your text in dealing with companies that sell you components and services. It's an example of the creative buying needed to boost materials efficiency. The potential is attractive because materials account for half or more of costs, and only through greater efficiency can you hope to meet the triple threat of inflation, spiraling wages, and adverse trade trends.

One way to implement Mr. Romney's idea is to give added reach to the purchasing agent. The average buyer has only three people reporting directly to him. He needs help. Here are five approaches that will assist him to get it via his venders:

1. Be systematic in appraising suppliers' performance.
2. Ask for help.
3. Know suppliers better.
4. Co-operate more with venders.
5. Change sources if all else fails.

## Be Systematic

"Just sit and wait for suppliers to come up with ideas, and you'll be lucky to get a good one a year," says a Chicago manufacturer. "You've got to meet them more than half way."

Thompson Ramo Wooldridge Inc., Cleveland, has purchasing analysts whose function is to work with venders. Don Carney is one. He started with TRW as an apprentice and has had wide background in tooling, tool design, industrial engineering, and manufacturing. His biggest attribute, however, is the psychological skill in getting people (both the venders' and TRW's) to change.

TRW's associate directors of purchasing, John Tunder and R. F. Vindervater, also make this point: "An organized program forces you to keep thinking. It should emphasize quality and timeliness as well as the cost angle."

They add: "Although the majority of cost cutting or other ideas coming up in purchased items probably originate with Thompson people, the venders' co-operation and abilities are indispensible."

TRW regularly checks all items it buys but naturally concentrates on those that would appear to give

## Where to Find Good Suppliers

***Interview salesmen . . .***

Some 67 salesmen call at Standard Pressed Steel Co. each day. "So the buyers must be schooled in their products," says John P. Moorhouse, director of purchases. "If the buyer can talk with the salesman in his own language, he will be better able to buy creatively." Mr. Moorhouse, right, is with Emil Carlson, Standard Varnish Co.

***Solicit venders' help . . .***

Greenlee Bros. & Co. does it with this display in the visitor's room—it shows steps in the manufacture of an expansive bit. Vender representatives, such as W. H. Stuck, left, of Pittsburgh Tool Steel Wire Co., have come up with suggestions for John M. Stewart, purchasing agent for Greenlee Bros., Rockford, Ill.

the best results. In the cost-cutting area, it has two broad approaches:

1. It takes a look at all parts that are forged, cast, stamped, or made by welding. It then surveys the field to see if the forgings could be made as well or better as castings or vice versa. One of its examinations turned up this example: It was buying a rough forging, but study showed that purchase of a partly processed forging would give it a 43 per cent lower final cost.

2. The second approach is sometimes initiated by the vender. It involves improvement in designing, producing, heat treating, or otherwise dealing with the part or material. Example: TRW had been buying raw stock and heading the bolts with its own equipment. The supplier persuaded it to buy a headed bolt. The end result was a 10 per cent saving.

Many companies have installed formal vender rating systems. J. L. Leppla, purchasing agent for the Aeronautical Div., Minneapolis-Honeywell Regulator Co., Minneapolis, tells why: "One of the first things you will find if you install a system is that the old seat of the pants way is not really as good as many believed. More and more detail work in purchasing is being automated. It is impossible for our buyers to have the day-to-day contacts with venders or their performance that they may have had in the past. So we need a system to give this information in a condensed form."

The simplest formal system is the type used by ElectroData Div., Burroughs Corp., Detroit. Each month, each vender gets a quality rating of excellent, acceptable, or unacceptable. Excellent means that 90 per cent or more of the vender's lots inspected that month were O.K. An acceptable rating means that 80 to 89 per cent were O.K. Any vender who had less than 80 per cent of his lots accepted gets the unacceptable rating.

A little more complicated is the system used by Collins Radio Co., Cedar Rapids, Iowa. It rates each supplier's delivery in terms of quality, quantity, delivery, and price.

The system at Minneapolis-Honeywell's Aeronautical Div. is based on the statistical computation of deviations in the acceptable quality levels—60 is just passing, 75 is average, 90 is good. It also rates venders on price and delivery and is thus able to rank them on an over-all basis.

The formal rating systems are tools to help judgment. But they are not substitutes for judgment, imagination, curiosity, or just plain skepticism.

One rule followed by L. A. Dahlheimer, director of purchases for Emerson Electric Mfg. Co., St. Louis: Always check for equivalent items; don't automatically accept what the engineers specify.

Example: Although he is buying a new kind of stock for motors that costs $9 a ton less than its predecessor, machines just as easily, performs the function just as well as the type originally specified, he's already investigating another ma-

***Accept suppliers' aid . . .***

They're selling service more than ever, but too often their customers ignore it. You'll be rewarded in attending shows like this put on by a Los Angeles service center, Kilsby Tubesupply. Its Tube-O-Rama exhibition featured 61 exhibitors, displaying developments in manufacture, fabrication, and assembly of tubular products.

***Seek the technically based company . . .***

Size is no clue to its brainpower. Take the 15-employee firm of Materials Electronic Products Corp., Trenton, N. J. A bismuth telluride alloy has been developed as a promising thermoelectric material by (left to right) Dr. Robert Bernoff, director of research; Dr. Samuel Shapiro, president; and Robert Jensen, executive vice president.

terial to replace the new one. It would save another $13 a ton.

## Ask for Help

Mr. Dahlheimer and other alert purchasing agents don't hesitate to ask for help. Thompson even carries this notice on all its requests for quotations: "We welcome any suggestions or recommendations which may result in cost savings. Please submit with your bid."

"A surprising number of buyers don't ask questions," says John E. Doxsey of the Steel Service Center Institute Inc. "Or they don't ask the right questions; or they don't get to the right people."

Many don't ask for fear of showing ignorance. Actually, it's no disgrace not to be up on all the more than 10,000 steels now available. Comparable arrays are available in other major materials. Even the experts can be up to the minute on only their specialties. But it is a disgrace if you don't ask.

The wrong question causes troubles too. A purchaser or designer often moves heaven and earth to find a supplier of a special steel when what he really needs is a more common (and cheaper) grade that many a good steel service center carries.

Another error by the customer is to ask the wrong person. Example: A fabricator wanted special credit terms and asked the service center salesman for them. He referred the question to the credit manager who followed the rulebook and said no. The sale would have been lost if the salesman had not mentioned the problem to his president. He called on the distraught customer, found that his financial management was obsolete. What he needed far more than special credit was a modernization of his financial methods. The supplier had some suggestions. The special credit was granted on a one-shot basis, with the promise by the fabricator to accept the supplier's suggestions.

By asking three suppliers for a new method of packaging her firm's product, Mrs. Doris L. Geil, purchasing agent for Broderick & Bascom Rope Co., St. Louis, got an answer that cut costs 50 per cent. One vender proposed an inner sleeve, corrugated carton to replace a telescopic, fiberboard carton.

## Know Suppliers Better

This involves selling in reverse—letting your supplier know as much about your company as possible, getting acquainted with as many key people in the supplier's organization as possible.

"You can't pick the suppliers' brains unless your purchasing agent can speak the suppliers' language," says John P. Moorhouse, director of purchases for Standard Pressed Steel Co., Jenkintown, Pa.

So each SPS buyer (11 in all) has a specialty—one buys steel, another equipment, a third purchases office supplies. All have had shop experience—one is a lawyer, another a metallurgist, a third is an accountant by experience (he handles of-

fice supplies). Three are engineers.

To make maximum use of suppliers, the purchasing agent must spend almost as much time outside as inside, experts agree. Points to check: Testing facilities, management quality, growth rate. A steel buyer at SPS, for example, will visit each mill supplier at least once a month. He wants to see what the supplier is doing. He looks for new materials—talks to research people. He checks their production facilities so that he knows what they can do for him—the range of sizes, shapes, and other specifications they are equipped to provide.

An example of how it pays to know your supplier: Aluminum Co. of America's Cleveland Works had finished with some expensive die blocks, but they were so large that Alcoa didn't have the equipment to cut them for re-use in smaller, more normal dies. Even scrapyards couldn't handle them. But Alcoa learned of little Reliable Steel Plate Co. in Cleveland (50 employees). Reliable did the cutting job without a hitch.

## Co-operate with Venders

This goes a step beyond knowing suppliers. It almost involves living with them, being important to them.

Emerson's Mr. Dahlheimer says: "We try not to spread our buying; we want to be important to our suppliers. We aim at having two venders for any purchased part or material." An illustration of the advantage of being important to a supplier: Emerson felt no shortage of steel during the 1959 strike.

In specific areas, co-operation can often yield the best dividends in design. "Get together with the supplier while you're designing the product, not after the designs are frozen," advises Lowell D. Ryan, executive vice president of Malleable Founders' Society, Cleveland.

Example: Early in the designing stage, a farm implement maker consulted with Dalton Foundries Inc., Warsaw, Ind. A chain sprocket, made from a steel cutout to which the hub was welded, was redesigned as a cast malleable part that proved 12 per cent less costly than the former method of manufacture.

Example: A packaging machine maker had a packaging problem himself. His bulky unit had to be shipped in a finished state. Northern Malleable Iron Co., St. Paul, designed a leg base in malleable that could be easily assembled by the machine's purchaser. The move solved the shipping problem and gave three added benefits—the malleable leg was one-third lighter than the former design, gave more stability to the assembly, and was 20 per cent cheaper to fabricate.

More and more suppliers or trade associations hold technical seminars for customers. Typical are those sponsored by Superior Steel & Malleable Castings Co., Benton Harbor, Mich. They run for 16 hours over two days and cover subjects like this: Metallurgy of iron and steel castings, testing and inspection methods, fundamentals of casting design, methods of manufacturing ferrous castings, methods of producing metal for castings.

It pays to know what suppliers can do in service too. Thompson Ramo Wooldridge has joined in a co-operative venture in custom warehousing with Universal Steel Co., Cleveland. TRW owns the steel, Universal stocks it and sends it to Thompson plants or suppliers on the owner's instructions.

Better co-operation with suppliers boils down to good diplomacy and more common sense.

Diplomacy saved Emerson $4500 in profits that otherwise would have been lost. A shipment of parts was due on the tenth. On the eighth, the vender reported he couldn't deliver until the sixteenth of the month. Emerson stood to lose $1500 a day in profits for each 24 hours the shipment was delayed. It told the supplier the facts. The parts arrived on the thirteenth.

"It's common sense," says Emerson's Mr. Dahlheimer, "to check first to see if you are at fault when you have a problem. Only when you know you haven't erred should you call in the supplier."

## Change Sources

When do you change suppliers? When a vender can't meet the best price, quality, delivery, or service—other factors being equal.

Usually, the wisest practice is to have at least two suppliers for your important parts or materials, the experts advise, but don't have more than three or four.

Multiple suppliers give you delivery insurance, of course, points out M. A. Norton, senior buyer, Reliance Electric & Engineering Co., "and they provide catalytic action too. It's often the supplier second or third on the list who tries the hardest to help so he can get more of the business."

Many companies use their vender rating systems to help them in determining the ranking of the suppliers or in deciding when to drop one. Minneapolis-Honeywell's Aeronautical Div. sends notices periodically to venders to show them how they're doing—good or bad. If the rating is unacceptable, it tells the supplier why and what to do. If it happens again, a sterner letter is dispatched. If the third strike comes, the vender is out.

Sometimes the supplier has nothing to offer and the only course is to find another. "When our vender told us there was no better way, we turned to Minnesota Mining & Mfg. Co.," says James B. Wallace, manager of bus duct engineering for Westinghouse Electric Corp. Minnesota Mining spent $175,000 to help solve a bus duct problem. As a result, the company boosted its sales to Westinghouse by $150,000 annually. The former supplier lost $80,000 worth of business a year.

Your supplier has the brainpower to help you. But you will have to find him, and once found you will have to meet him more than half way by knowing him well and co-operating with him.


**Materials Efficiency**

**Get Higher Reliability**

That's the article coming up Sept. 26 in STEEL's 1960 Management series. For a free copy of any or all articles in this 13-part program on materials efficiency (which started July 4 and is running every other week for the rest of the year), write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. Also available on the same basis is the companion series on production efficiency which appeared during the first half. Use of material like this may win you $1000. For details, see Pages 5 and 6.

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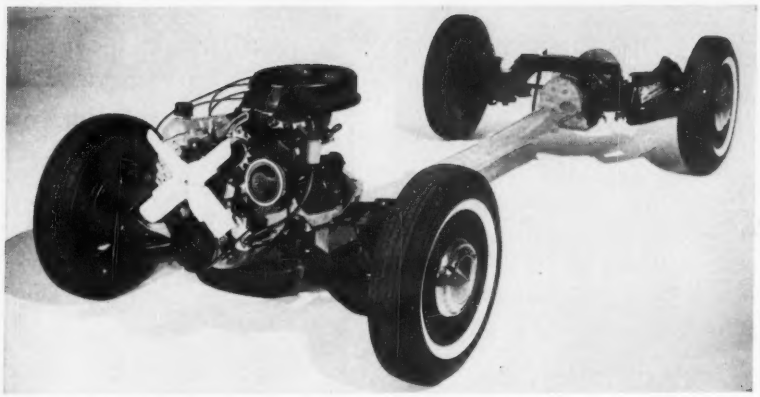
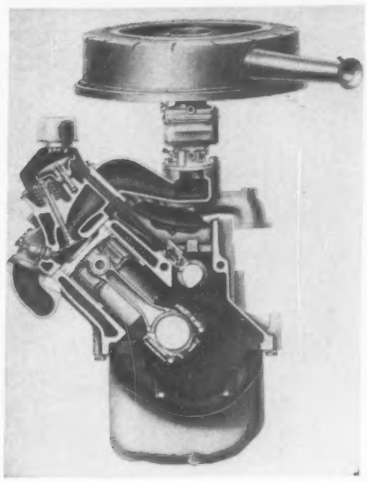
Replacement bearings available through United Motors System and its authorized bearing distributors.

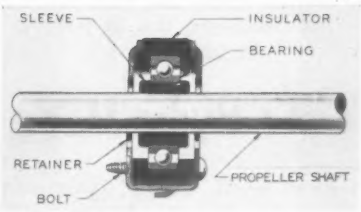
# HYATT HY-ROLL BEARINGS

IN ROLLER BEARINGS HYATT IS THE WORD FOR GM RELIABILITY



**NO FLOOR BOARD HUMP, NEW 4-CYLINDER ENGINE**—these are the highlights of Pontiac's new compact car, Tempest. Elimination of the hump is accomplished by mounting the transmission on the rear wheels and employing a whip propshaft. The engine is mounted on a 45 degree slant. Styling of the car will be similar to Oldsmobile and Buick compacts.






# Pontiac Unveils Tempest's Details

## U. S. Auto Output

Passenger Only

| | 1960 | 1959 |
|---|---|---|
| January | 688,731 | 545,756 |
| February | 659,323 | 478,518 |
| March | 654,242 | 576,080 |
| April | 582,909 | 578,846 |
| May | 611,226 | 546,817 |
| June | 613,147 | 557,995 |
| July | 434,377 | 555,410 |
| August | 305,527 | 239,152 |
| 8 Mo. Totals | 4,549,482 | 4,078,574 |
| September | | 258,151 |
| October | | 507,527 |
| November | | 254,527 |
| December | | 494,931 |
| Total | | 5,593,707 |

| Week Ended | 1960 | 1959 |
|---|---|---|
| Aug. 6 | 103,504 | 108,240 |
| Aug. 13 | 84,139 | 72,603 |
| Aug. 20 | 47,437 | 31,848 |
| Aug. 27 | 38,952 | 18,335 |
| Sept. 3 | 51,553† | 17,261 |
| Sept. 10 | 60,000* | 24,364 |

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

PONTIAC DIV. has revealed engineering details of its 112 in. wheelbase Tempest which will be introduced in two models, a four door sedan and a station wagon. Tempest is 180 in. long, 72 in. wide, and 54 in. high. Styling details aren't officially available, but autodom is well aware that there's a remarkable similarity between it and the Oldsmobile and Buick compacts. However, drive trains are significantly different. Tempest appears to be most unique of the three. It offers a four cylinder engine, transaxle, whip propshaft, and independent four wheel suspension.

• **Engines**—Tempest will be the first U. S. built car to sport a four cylinder engine since Willys disappeared in 1955. The gray iron block is adapted from Pontiac's conventional overhead valve V-8, minus the left cylinder bank. It's machined on the same line as the V-8, which makes for lower manufacturing costs and interchangeability of parts. Bore and stroke are the same as the V-8.

The engine is mounted at a 45 degree slant. Main bearings, pistons, aluminized valves and valve lifters are common to the parent engine. Exhaust pipe and manifold are on the right. Intake manifold, carburetor, fuel pump, generator, and starting motor are on the left for easy service.

Pontiac also will offer the 215 cu in., water cooled, V-8 aluminum engine that will be used in Buick and Oldsmobile compacts.

• **Transmission** — Like Corvair, Tempest has its transmission mounted in the rear which gives equal weight distribution to the car and eliminates the hump in front of the firewall. The manual synchromesh shift shares a common lubrication system with the rear axle, which makes it more of a true transaxle. The two speed automatic has sep-

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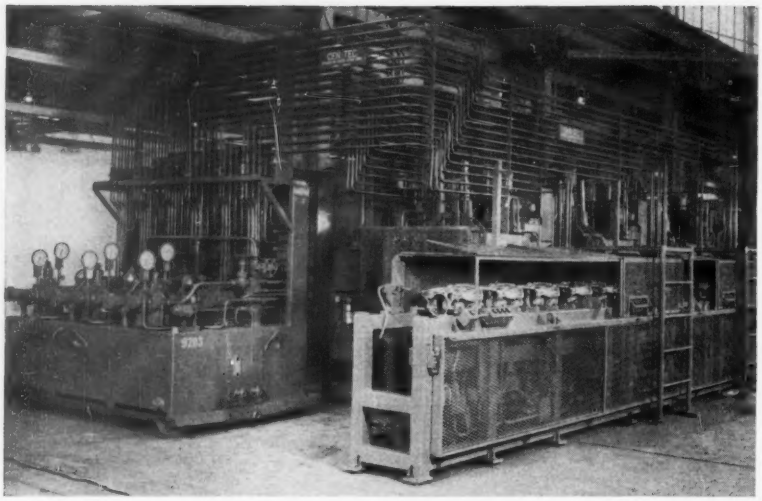
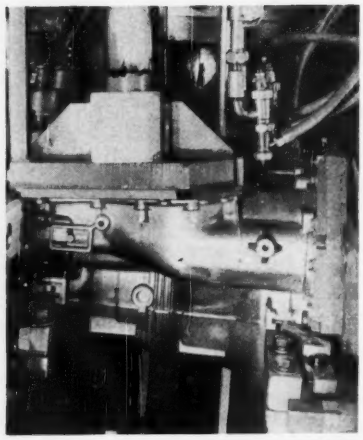
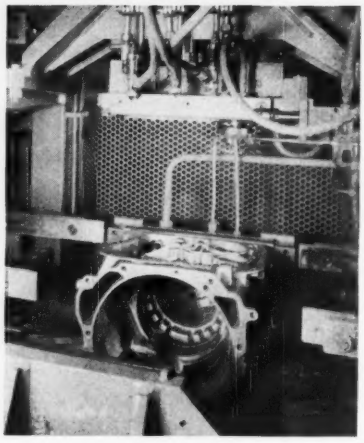


Aluminum transmission cases come from an automatic, dry leak tester at the end of the machining line at GM's Detroit Transmission Div., Willow Run, Mich.





Test chamber with sealing mechanism pulled back (above) and (below) in sealed position

# GM's Hydra-Matics Get Dry Leak Test

ALUMINUM, diecast transmission cases for General Motors' 1961 Hydra-Matic transmissions will be dry leak tested automatically by units installed at the end of machining lines at Detroit Transmission Div., Willow Run, Mich. The equipment is made by Cen-Tec Div., Centri-Spray Corp., Livonia, Mich.

Three separate tests are conducted at each of three stations:

- Main cavities are checked with 29 in. of vacuum.
- Accumulator bores are tested at 20 psi for porosity leaks.
- Pressure passages in the system are checked at 40 psi.

The test cycle at each station takes about 45 seconds. The machine can handle 250 cases an hour.

After cases move into the unit, a mechanism seals off all openings. Air in the main cavity is exhausted by a self-contained vacuum system. Air pressure from plant lines is applied simultaneously to bores and pressure passages.

A differential pressure sensing cell with two cavities is used to determine leakage. One cavity serves as a reference cell. Connections from the other cavity are applied directly to the part.

When pressure drops, a transducer triggers an electrical impulse which automatically actuates control panel lights and a marking device. Three ink dots appear across the top of the case if a part is unsatisfactory.

---

arate lubrication (see STEEL, Jan. 25, p. 49).

The three stage torque converter is behind the rear transmission unit and separated by the differential carrier. The arrangement provides a split torque setup. In high gear, 40 per cent of the drive is mechanical and only 60 per cent of the torque goes through the converter. Result—less slip, more drive efficiency.

• **Propshaft**—Probably the most unusual development in the Tempest drive train is the flexible propeller shaft which is used instead of a conventional, tubular steel propshaft (see STEEL, Mar. 14, p. 63). A slightly curved box section housing of stamped steel joins the engine and transmission. Running through it is a forged propshaft of $\frac{5}{8}$ in. bar steel. The shaft is flexible so it can be curved slightly to follow the housing line, which gives the car an almost flat floorpan.

The housing supports the propeller shaft bearings. Pontiac engineers believe the arrangement permits less engine vibration because the housing divorces engine torque reaction from the engine mounts, which are softer than usual mounts.

• **Suspension** — Independent suspension for each wheel follows the Corvair concept. Front coil springs on the Tempest are seated on the lower control arm, and the shock absorbers operate within the coils.

The swing axle rear suspension has a crossmember attached to the unitized body in four positions. The transaxle support is attached to the crossmember. Rear axleshafts are tied into each side of the differential with universal joints that have a splined yoke extending into the side gears of the case. Tempest has a 57 in. tread to maintain Pontiac's "wide track" claims.

# CASE HISTORIES

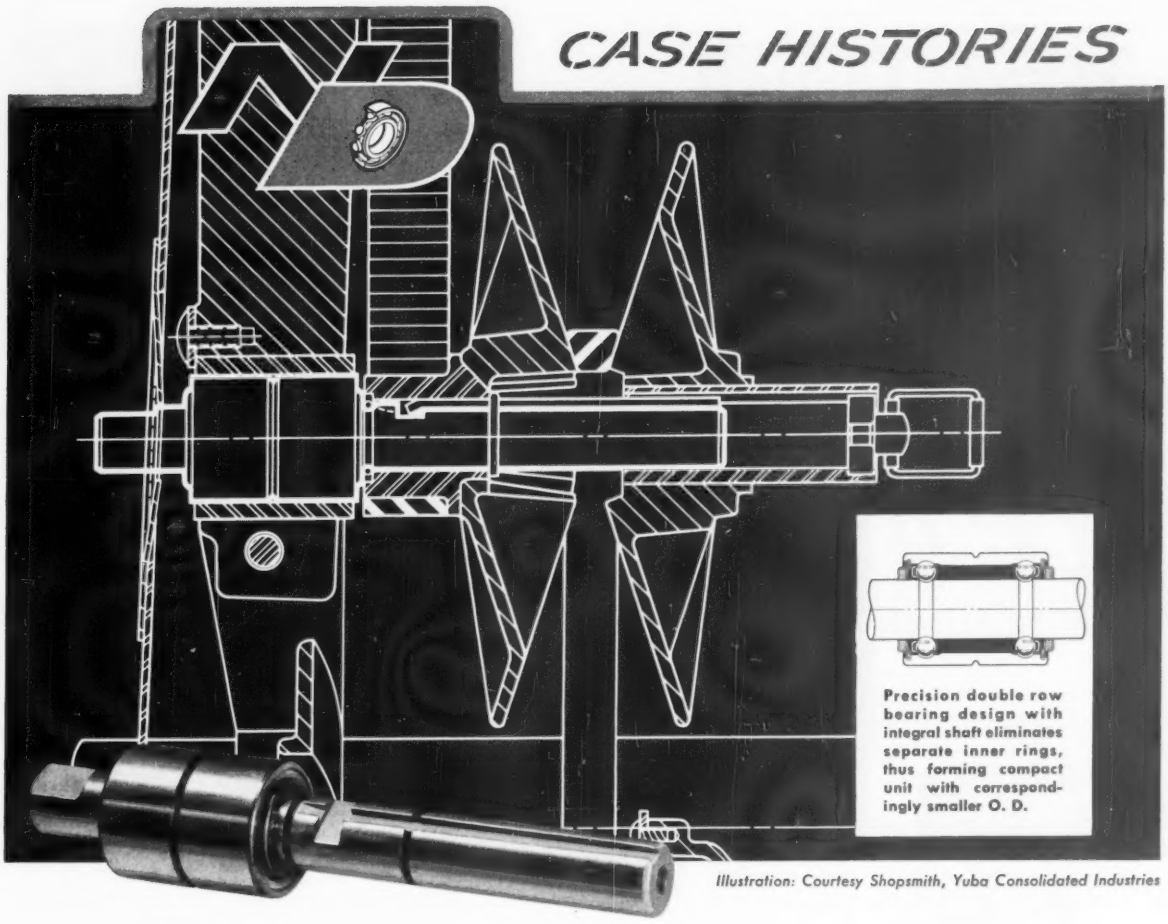

Precision double row bearing design with integral shaft eliminates separate inner rings, thus forming compact unit with correspondingly smaller O. D.

*Illustration: Courtesy Shopsmith, Yuba Consolidated Industries*

## N/D Bearing Solves Home Power Tool Speed Changing Problem!

**CUSTOMER PROBLEM:**

Require low cost, compact idler shaft assembly for speed changer in popular, multi-purpose home power tool. The assembly must mount on ball bearings . . . operate at speeds up to 6000 RPM.

**SOLUTION:**

N/D Sales Engineer, cooperating with customer engineers, recommended a *single* N/D ball bearing —a compact integral shaft unit designed as part of idler assembly. The unit permits one of two interlocking variable pitch pulley halves to slide axially on shaft when changing pitch at high speed. This precision, automotive type fan and water pump bearing eliminates extra parts inventory and shaft machining . . . reduces assembly time. In addition to solving complex design problem, N/D's compact heavy-duty ball bearing is integrally sealed for protection against saw-generated dust . . . and lubricated-for-life for added end user sales appeal!

If *you're* designing new equipment, why not call your New Departure Sales Engineer. He probably can help engineer your application with a standard, volume-produced N/D ball bearing that will help solve your bearing problem. For more information contact New Departure Division, General Motors Corporation, Bristol, Connecticut.

***Replacement ball bearings available through United Motors System and its Authorized Bearing Distributors.***

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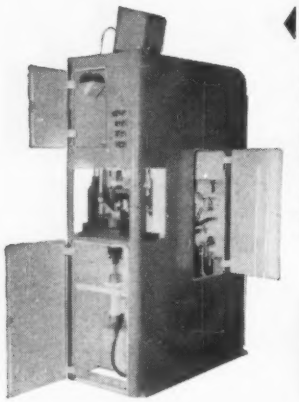
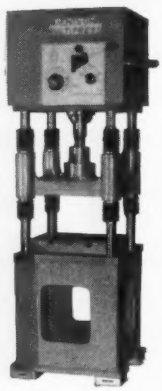
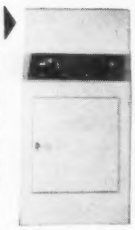
# NEW PRESSES



**MULTI-COMPACTION PRESS** *shown with access doors open. Tooling setup shown is for production of tantalum capacitor anodes. Reel of tantalum wire (seen in upper compartment) is straightened, cut to exact length and fed vertically into the press. Powdered tantalum is automatically fed from overhead hopper into compaction die cavity.*





**SERVO-DRIVEN MULTIPRESS "600"** *with movable console which contains operating controls. Note rugged platen and large daylight area. Control lever on upper panel adjusts ram stroke for ¼", ½", ¾", 1", 1½", 2" and 3" work strokes. Feed mechanism is automatically adjusted when operating speed is varied.*

**TWO NEW PRESSES** fill the long-standing need for a high speed hydraulic progressive stamping press and a productive, dependable powdered materials compaction press. Here are some of the key features of these advanced new units:

**High Speed Servo-driven Multipress "600"**

- 600 strokes per minute with 25-ton capacity.
- Strokes per minute and ram pressures are adjustable while press is operating.
- Simple lever adjustment of ram stroke length. Cams can be easily changed for special work strokes.
- Harmonic cam drive automatically sequences the feed mechanism for perfect cycling with ram operation.
- Punch breakthrough is adjustable . . . does not rely on mechanical stops.
- Press frame and power unit are shock-mounted . . . resulting in minimum operating noise level.

**Multi-Compaction Press**

- Designed for volume production of ferrous, non-ferrous and exotic metals . . . glass and plastics.
- Fully automatic, unattended operation.
- Enclosed tooling area eliminates spillage and loss of material.
- Single or automatic cycle operation . . . all-hydraulic control.
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Your nearby Denison hydraulic press specialist can show you how the new Multipress "600" and the Multi-Compaction press can help make your products better for less. Call, write or wire for details.

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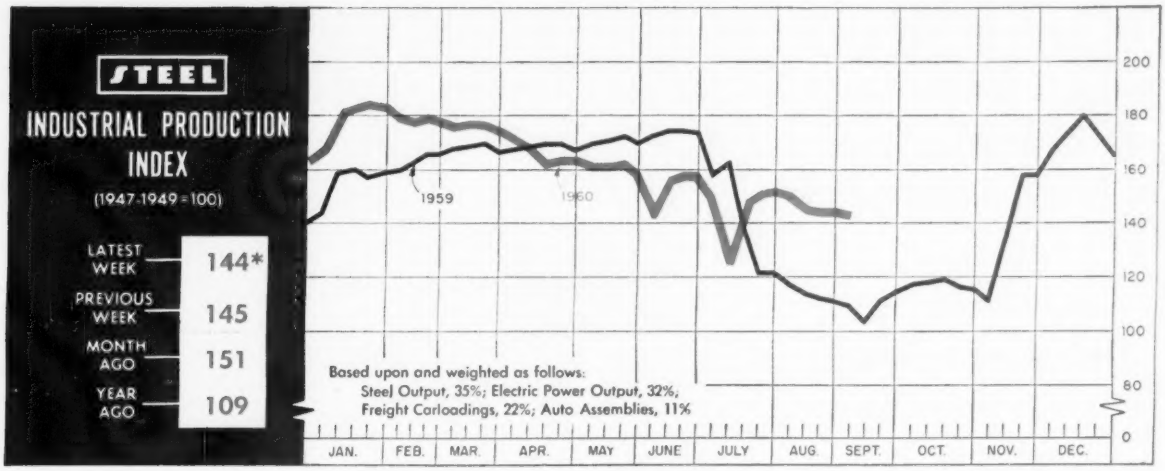
HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

# DENISON
## HYDRAULIC MULTIPRESS




*Week ended Sept. 3.

# Buyers Peg Moderate Fall Upswing

LABOR DAY is looked upon by businessmen as the schoolboy views the first warm day of spring—it means brighter times ahead. Traditionally, the holiday marks the end of summer lethargy and the start of a fall upturn in business.

Except for 1957, in the last five years STEEL's index of industrial production has started an upward surge by mid-September. There is evidence that we are again emerging from summer's lull, but the August report by the National Association of Purchasing Agents indicates there's still no real "oomph" in the economy. Most purchasing agents polled look for a continuation of the sidewise movement in the immediate weeks ahead.

Emphasis is still on reducing stocks of material on hand. Forward commitments are being held to the minimum needed to meet production schedules.

• **Orders Up**—However, the NAPA says production and new order statistics have definitely improved in the last 30 days. A jump to 35 per cent of the respondents reporting an improved order situation contrasts with 24 per cent in this category in July. Similarly, 36 per cent said their orders were down in July; only 23 per cent so reported in August.

While production figures are better, the change is not as great. Twenty-six per cent tell of higher production compared with 22 per cent in July, and 25 per cent indicate a lowered production rate compared with 30 per cent in July.

Although employment continues to be a problem, the situation is likely to improve as the 1961 automobiles get into full production. And since new car output will hit full stride earlier this year than last, it may add some zip to an upturn.

• **Capital Spending Stalls**—In reporting on capital improvements, 39 per cent of the purchasing agents said they have no intention of

## BAROMETERS OF BUSINESS

| | LATEST PERIOD* | PRIOR WEEK | YEAR AGO |
|---|---|---|---|
| **INDUSTRY** | | | |
| Steel Ingot Production (1000 net tons)[2] | 1,441[1] | 1,483 | 327 |
| Electric Power Distributed (million kw-hr) | 14,602[1] | 14,453 | 14,109 |
| Bituminous Coal Output (1000 tons) | 7,780[1] | 8,020 | 7,320 |
| Crude Oil Production (daily avg—1000 bbl) | 6,846[1] | 6 842 | 6,765 |
| Construction Volume (*ENR*—millions) | $604.0 | $406 4 | $492.4 |
| Auto, Truck Output, U. S., Canada (*Ward's*) | 66,311[1] | 54,874 | 33,275 |
| **TRADE** | | | |
| Freight Carloadings (1000 Cars) | 595[1] | 596 | 550 |
| Intercity Truck Tonnage (changes from year ago) | −2.9% | −3.0% | +41.1% |
| Business Failures (Dun & Bradstreet) | 315 | 279 | 257 |
| Currency in Circulation (millions)[3] | $31,980 | $32,087 | $31,935 |
| Dept. Store Sales (changes from year ago)[3] | +4% | +5% | −7% |
| **FINANCE** | | | |
| Bank Clearings (Dun & Bradstreet, millions) | $23,649 | $24,920 | $23,275 |
| Federal Gross Debt (billions) | $288.6 | $288.0 | $290.4 |
| Bond Volume, NYSE (millions) | $20.0 | $24.4 | $27.0 |
| Stocks Sales, NYSE (thousands of shares) | 14,952 | 15,298 | 11,576 |
| Loans and Investments (billions)[4] | $104.4 | $105.0 | $103.9 |
| U. S. Govt. Obligations Held (billions)[4] | $27.2 | $27.2 | $29.3 |
| **PRICES** | | | |
| STEEL's Finished Steel Price Index[5] | 247.82 | 247.82 | 247.82 |
| STEEL's Nonferrous Metal Price Index[6] | 230.3 | 229 9 | 220.4 |
| All Commodities[7] | 119.3 | 119.4 | 119.3 |
| Commodities Other than Farm & Foods[7] | 128.4 | 128.3 | 128.3 |

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

# NEW BULLETIN

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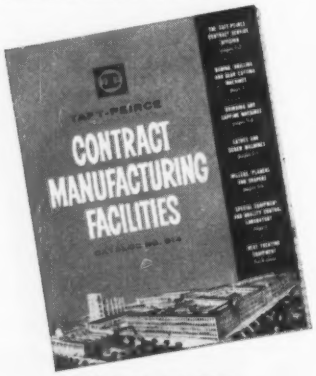


TPO-9

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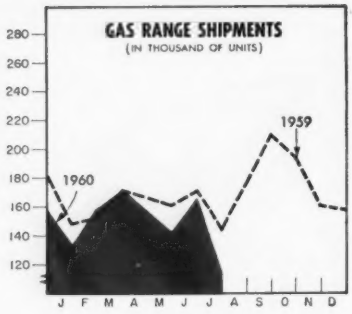
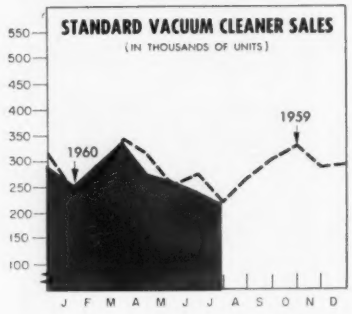
## THE BUSINESS TREND




**Shipments—Units**

| | 1960 | 1959 | 1958 |
|---|---|---|---|
| Jan. .. | 133,500 | 148,700 | 128,200 |
| Feb. .. | 158,600 | 152,400 | 134,200 |
| Mar. .. | 171,900 | 171,200 | 149,300 |
| Apr. .. | 156,300 | 165,800 | 148,200 |
| May .. | 144,600 | 160,300 | 147,200 |
| June .. | 167,200* | 170,900 | 155,900 |
| July .. | 113,400* | 143,700 | 129,100 |
| Aug. .. | ..... | 176,100 | 157,700 |
| Sept. .. | ..... | 210,300 | 182,300 |
| Oct. .. | ..... | 194,500 | 212,200 |
| Nov. .. | ..... | 159,600 | 171,200 |
| Dec. .. | ..... | 156,900 | 181,000 |
| Totals . | ..... | 2,010,500 | 1,896,500 |

*Preliminary.
Gas Appliance Mfrs. Assn.
Charts copyright, 1960, STEEL.

| | 1960 | 1959 | 1958 |
|---|---|---|---|
| Jan. .... | 258,330 | 242,516 | 265,489 |
| Feb. .... | 294,483 | 271,396 | 225,631 |
| Mar. .... | 339,918 | 346,557 | 291,418 |
| Apr. .... | 278,391 | 317,402 | 247,293 |
| May .... | 265,556 | 257,345 | 218,766 |
| June .... | 245,790 | 275,974 | 253,127 |
| July .... | 223,008 | 221,232 | 263,778 |
| Aug. .... | ..... | 268,465 | 280,226 |
| Sept. .... | ..... | 305,096 | 299,618 |
| Oct. .... | ..... | 330,899 | 339,127 |
| Nov. .... | ..... | 290,130 | 293,609 |
| Dec. .... | ..... | 293,818 | 316,965 |
| Totals ... | ..... | 3,420,830 | 3,295,047 |

Vacuum Cleaners Mfrs.' Assn.

spending any more or any less than they did in the first half of 1960; 35 per cent revealed they were cuting back on second half expenditures; 26 per cent will spend more for capital improvements than they did in the first half.

• **Why the Lull?**—Because the rosy predictions of last fall have failed to materialize and because we seem to be in a leveling out period, some businessmen look to fall somewhat shakily, and others are downright gloomy. What's behind the uncertainty and how can we justify continued optimism, especially in view of those who claim we are slipping into another general recession?

• **Changed Attitudes**—The Federal Reserve Bank of Philadelphia puts forth a reasonable analysis. For some years, people seemed to be preoccupied with their own problems. Now they are vitally interested in what is going on around them. So for the moment, the sudden awareness of big issues is generating pessimism. Such thinking is reflected in the lack of zing in the stock market and its influence on overall business.

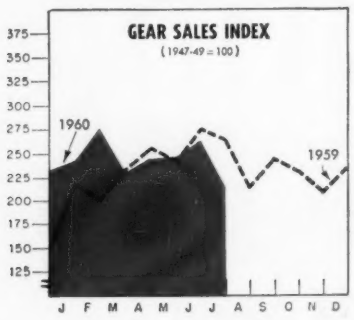
The pessimists don't say we are headed for a 1957-58 recession, but they believe we are following the recession - growth - leveling - recession cycle.

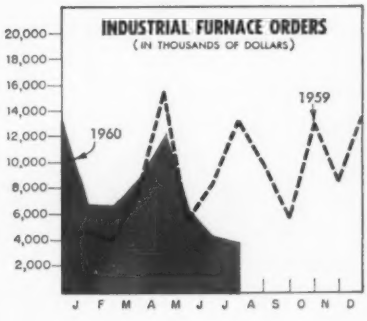
• **Changed Patterns** — The FRB doesn't believe that we can use 1955-56 as an analogous period. The excesses of that recovery planted new seeds of recession. In 1958 and 1959, the rate of recovery was stepped up as the nation braced for the steel strike. If that was the boom, the offsetting bust came during and following the strike.

• **Whither the Spark?**—The upward movement since the low point in 1958 has been somewhat restrained. So where will the business strength come from?

Probably not from business spending, the FRB feels. Any sizable increase for plant and equipment is virtually ruled out by excess capacity.

How about consumer spending? The consumer isn't the same man he was in the postwar period. He's older, better stocked with consumer goods, more debt ridden. His spending isn't as responsive as it was. But while a spending spree is unlikely, it is possible that consumer spending will rise rather strongly above current levels. Even modest in-




| | Bookings | | Shipments | |
|---|---|---|---|---|
| | 1960 | 1959 | 1960 | 1959 |
| Jan. | 243.4 | 218.6 | 207.3 | 187.7 |
| Feb. | 278.6 | 199.9 | 230.2 | 201.5 |
| Mar. | 231.8 | 234.3 | 244.6 | 222.7 |
| Apr. | 249.2 | 255.6 | 234.8 | 231.8 |
| May | 246.9 | 241.0 | 241.3 | 223.9 |
| June | 269.8 | 274.2 | 253.6 | 239.7 |
| July | 217.5 | 262.8 | 210.8 | 199.8 |
| Aug. | .... | 213.3 | .... | 204.3 |
| Sept. | .... | 213.9 | .... | 216.1 |
| Oct. | .... | 230.5 | .... | 224.1 |
| Nov. | .... | 208.7 | .... | 224.2 |
| Dec. | .... | 233.9 | .... | 250.2 |
| Avg | .... | 234.7 | .... | 218.8 |

American Gear Mfrs. Assn.

| | 1960 | 1959 | 1958* |
|---|---|---|---|
| Jan. | 6,827 | 4,545 | 3,047 |
| Feb. | 6,784 | 3,596 | 3,684 |
| Mar. | 9,033 | 7,842 | 2,871 |
| Apr. | 12,464 | 15,517 | 3,572 |
| May | 6,352 | 5,315 | 954 |
| June | 4,340 | 8,230 | 3,672 |
| July | 3,966 | 13,141 | 5,169 |
| Aug. | .... | 9,738 | 3,533 |
| Sept. | .... | 5,560 | 4,846 |
| Oct. | .... | 12,967 | 3,105 |
| Nov. | .... | 8,442 | 5,597 |
| Dec. | .... | 13,437 | 4,284 |

*Does not include industrial ovens.
Industrial Heating Equipment Assn. Inc.

creases in spending for houses, automobiles, and appliances would rule out the "inevitable" recession some expect.

Government spending will rise for the next year or so, although it will be modest. Local spending has been pressing higher.

• **Outlook**—The future doesn't look overly strong, but it doesn't appear to be overly weak either.

## Farm Building Booms

Farmers spent more than $2.4 billion on their buildings in 1959, an 11 per cent gain over the 1958 figure, reveals the Department of Agriculture. Why the spurt? It's part of the revolution going on at the farmstead as farmers move toward greater mechanization in the handling of feed and livestock, says the *Farm Journal*.

New farmstead layouts often require replacement of old buildings. Modern mechanization usually calls for major remodeling or erection of a completely new structure.

In the last ten years, farmers have spent 34 to 41 per cent of their annual capital expenditure for new construction or major improvements. Total value of all farm buildings in the country is now $28.1 billion.

## Trends Fore and Aft

• The full impact of lagging sales in the home construction industry was felt by gas heating equipment manufacturers in July. Factory shipments of central heating units fell 30 per cent (to 93,568 units) below the July, 1959, level, reports the Gas Appliance Manufacturers Association.

• July shipments of fabricated structural steel were the second best monthly total recorded this year, says the American Institute of Steel Construction. Steel deliveries amounted to 301,249 tons, 26 per cent better than the strike hampered July of a year ago. Total shipments during the first seven months of 1960 were 1.9 million tons, 2 per cent over the same period of 1959.

• The new order index for industrial supplies and machinery fell 6 points to 191 (July, 1948 = 100), continuing the slight but steady drop from the 221 high reached in March, 1959, says the American Supply & Machinery Manufacturers Association Inc.

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- Ohioloy "K" Rolls
- Flintuff Rolls
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- Chilled Iron Rolls
- Nioloy Rolls
- Forged Steel Rolls
- Denso Iron Rolls
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*E. W. Bliss president*

R. WAYNE McLAUGHLIN
*Elliott's Ridgeway gen. mgr.*

EVEN T. COLLINSWORTH JR.
*Fansteel Metallurgical exec.*

HOWARD A. BAXTER
*Norma-Hoffmann eng. v. p.*

**J. Ralph Patterson** was elected president and chief executive officer of **E. W. Bliss Co.**, Canton, Ohio. He succeeds **Robert Potter**, elected chairman. Mr. Patterson was vice president in charge of the Mackintosh-Hemphill Div., Pittsburgh. **Belmont Pinney** was named to the new post of assistant manager, Hastings, Mich., Div.

**Homer C. Lackey**, manager of forge products for United States Steel Corp., was elected president of **Erie Forge & Steel Co.**, Erie, Pa., to succeed **A. R. Gaus**, who will act in an advisory and consulting capacity.

**R. L. Hanes** was made general manager of tubular sales of **Colorado Fuel & Iron Corp.**, Denver. He was assistant to the vice president-sales.

**Robert C. Lombard** was made works manager, **Chicago Hardware Foundry Co.**, North Chicago, Ill. He was production and sales manager, Harsch Ebaloy Foundry Co., a division of Consolidated Foundries & Mfg. Corp.

**Anthony Demos** joined **Frank Samuel & Co.**, Philadelphia, a division of Howe Sound Co., as manager of metallurgical sales. He was with Foote Mineral Co.

**E. W. Kalb** was made manager of market development at **Vanadium-Alloys Steel Co.**, Latrobe, Pa.

**Textile Machine Works**, Reading, Pa., appointed **Albert E. Edwards** to the new post of assistant vice president-manufacturing. He was vice president of W. L. Maxson Co.

**R. Wayne McLaughlin** was made general manager, Ridgeway, Pa., operation of **Elliott Co.**, a division of Carrier Corp. A vice president of Elliott, he was manager of the Engineering Dept. at the mechanical operation in Jeannette, Pa.

**Even T. Collinsworth Jr.** was elected executive vice president of **Fansteel Metallurgical Corp.**, North Chicago, Ill., and subsidiaries. Since 1959, he has been president of Carlon Products Co., Aurora, Ohio.

**Donald D. Kreisberg** was named superintendent of production control at **American Forge & Mfg. Co.**, McKees Rocks, Pa. He was associated for 19 years with Blaw-Knox Co.

**Erik O. Pierson** was made works manager, **Saco-Lowell Automotive Div.**, Saco-Lowell Shops, Saco, Maine. He was vice president and works manager of Whitin Machine Works.

**R. J. Foresman** was named a vice president of **Michigan Abrasive Co.**, Detroit. For many years, Mr. Foresman was vice president of Midwest Abrasive Co., and more recently served as vice president-sales and marketing of American Lincoln Corp.

**L. A. Brewer** was made manager of sales administration, **Wolverine Tube Div.**, Calumet & Hecla Inc., Detroit. Former manager of strubing sales, he is succeeded by **Carl T. Fuller**, former Chicago district sales manager.

**Howard A. Baxter** was elected vice president-engineering, **Norma-Hoffmann Bearings Corp.**, Stamford, Conn. He succeeds **Warren D. Anderson**, who continues as engineering consultant to the president, in addition to outside activities in development and consulting engineering.

**Albert H. Charlton** was appointed vice president, **Howe Sound Co.**, New York. He was president of Quaker State Metals Co., Lancaster, Pa., a firm he helped found in 1946, and which is now a division of Howe Sound.

**Wedgelock Corp.**, North Hollywood, Calif., promoted **Lewis C. Finkle** to executive vice president. **William Grant**, general manager, was elected a vice president. **James H. Lee** joined the firm as sales manager, Fastener Div.

**Charles R. Pearce Jr.** was made commercial manager, forged products, **United States Steel Corp.**, Pittsburgh. He succeeds **Homer C. Lackey**, resigned.

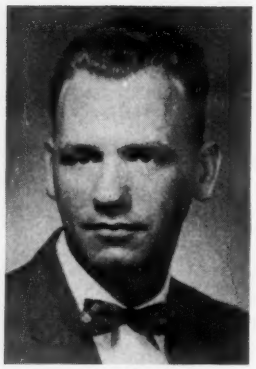
**Joseph E. Zwit** was made sales manager, Engineering Div., **Hauck Mfg. Co.**, Brooklyn, N. Y. He was Hauck's central regional manager.

**James W. Martin** was made works manager for **Bucyrus-Erie Co.**'s plant in South Milwaukee, Wis.

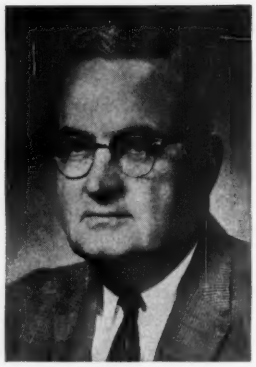
**Robert A. Titlow** was promoted to general superintendent of the Bedford, Ind., Fabricast plant of **General Motors Corp.**'s Central Foundry Div. He is succeeded as plant

RODNEY E. HANES
*Blaw-Knox group v. p.*

GEORGE BARRIE
*Coldform Div. sales mgr.*



LAWRENCE E. JENNINGS JR.
*new post at Bohn Aluminum*



SIMON FISHER
*National Elec. Welding pres.*

manager, Jones Mills, Ark., by **Robert P. Hendrichs.**

**Rodney E. Hanes** was appointed vice president-operations, Foundry & Mill Machinery Group, **Blaw-Knox Co.**, Pittsburgh. **Earl E. Vance** succeeds Mr. Hanes as plant manager, Wheeling Works.

**Sharon Steel Corp.**, Sharon, Pa., named **John P. Fierst** to the new post of field sales manager. He was Cincinnati district sales manager.

**William T. Rush** was made sales manager, Standard Control Div., **Westinghouse Electric Corp.**, at Beaver, Pa. **Charles E. Hammond** was named Central Pacific district manager of apparatus marketing to succeed **Harold G. Rethmeyer**, appointed special representative for Westinghouse in the Pacific Coast region.

**George H. Cleaver** was made manager of market research, Amco Div., **American Metal Climax Inc.**, New York. **Dr. William R. Opie** was made manager of research at the Carteret, N. J., laboratory of the subsidiary, Amco Research & Development Inc. **Robert R. Freeman** was made civilian markets manager for refractory metals of the division, Climax Molybdenum Co.

**John W. Rayner** was made administrative assistant at **Clearing Div.**, Chicago, U. S. Industries Inc.

**J. E. Acker** was made manager, **C. T. Baughman** assistant plant manager of **Ford Motor Co.'s** Ford Div. assembly plant at Metuchen, N. J. Mr. Acker replaces **E. J. Bond.**

**George Barrie** was made sales manager, Coldform Div., **H. K. Porter Company Inc.**, Detroit. He was sales manager, Hayes Industries Inc.

**Lawrence E. Jennings Jr.** fills the new post of product manager, Commercial Dept., for the Danville, Ill., Div. of **Bohn Aluminum & Brass Corp.**

**W. Kent Kise Jr.** was made assistant manager, electronic alloy sales, **Carpenter Steel Co.**, Reading, Pa.

**Simon Fisher**, general manager, **National Electric Welding Machines Co.**, Bay City, Mich., was elected president to succeed **Edward C. Smith**, who fills a new post of chairman.

**Robert A. Rohn** was made product manager, wire, rod and bar sales, **Aluminum Co. of America**, Pittsburgh, succeeding **D. B. Miller**, retired.

**K. Herron** was appointed Eastern

N. HARVEY COLLISSON

MILTON L. HERZOG

RICHARD M. FURLAUD

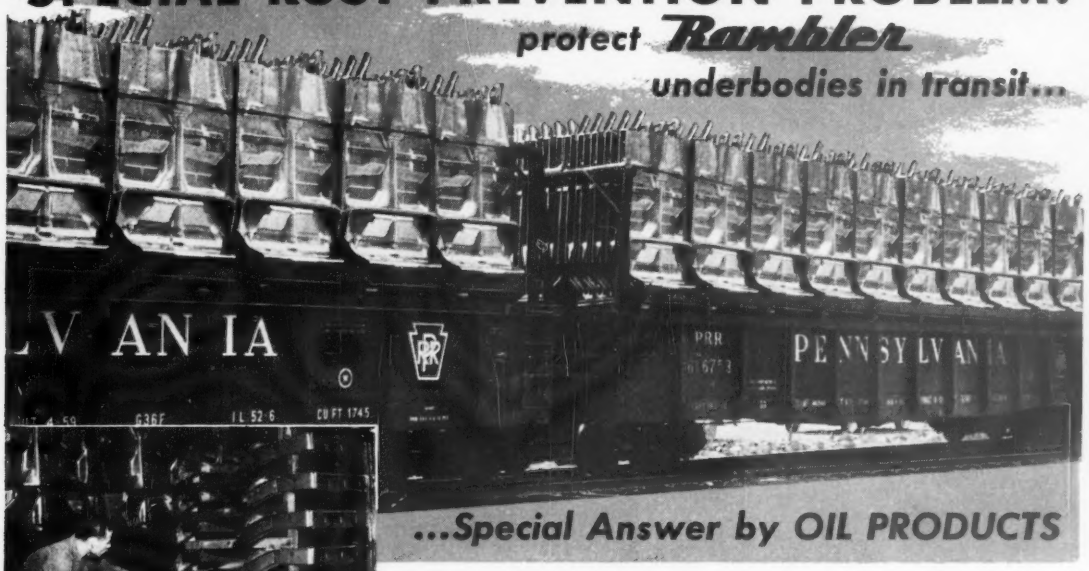
*executive promotions at Olin Mathieson Chemical*

ARTHUR T. SAFFORD JR.

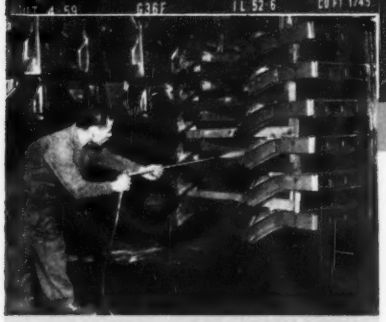
**Olin Mathieson Chemical Corp.**, New York, appointed **N. Harvey Collisson** senior vice president and chairman of the staff committee. He is succeeded by **Milton L. Herzog** as vice president-general manager, Metals Div. **Richard M. Furlaud** was named vice president-general manager, International Div., succeeding **Henry A. Arnold**, named a senior adviser of the corporation, continuing as a corporate vice president. **Arthur T. Safford Jr.**, director of marketing, was named corporate vice president-marketing. He succeeds **Donald A. Drummond**, who remains a corporate vice president and becomes a senior adviser.

# SPECIAL RUST PREVENTION PROBLEM:

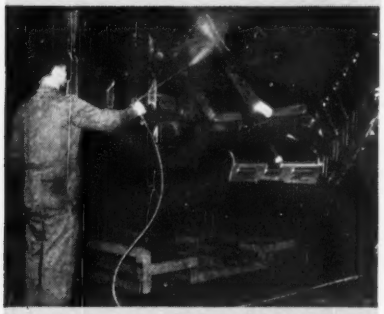
## protect *Rambler* underbodies in transit...



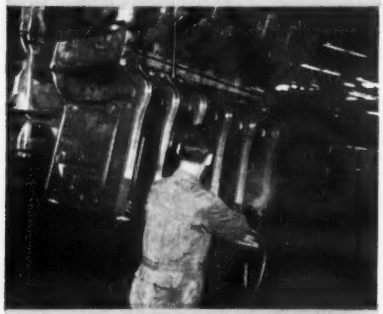

## ...Special Answer by OIL PRODUCTS



Rust preventive is sprayed on underbody bundles on loading dock. Note clean floor, small amount of absorbent required.



Carloading crane picks up bundle as sprayer covers bottom underbody. Thixotropic RP 252 gels on contact; does not run off.



Rust preventive is sprayed direct from drums through wide-angle spray nozzle. Last RP 252 goes on as bundle is lifted toward gondola car.

**THE PROBLEM:** Protect bare steel underbodies for up to two weeks outdoors in open gondola cars; keep rust preventive from running off on application; apply without fume hood or spray booth; make preventive quickly and completely removable; keep costs down.

**THE SOLUTION:** Frank Dreher, Budd metallurgist, Gary, Indiana, called on Nalco's Oil Products Division and other chemical suppliers for action. Oil Products developed RP 252, a thixotropic liquid corrosion inhibitor for this job. It is a high-flash-point, virtually colorless, odorless material that gels on contact with underbody metal. Spray coating at the loading platform is quick, clean, virtually fume-free. One man handles the entire operation; does not need protective mask or clothing.

**THE RESULTS:** Mr. Dreher (pictured left above with R. M. Kearns, Oil Products Sales Engineer) feels that the problem is solved satisfactorily. Rust prevention is complete; chemical costs are below previous material levels; substantially less oil-absorbent compound is required on floors in the spray area; American Motors removes RP 252 in an alkaline wash in one minute; and no residue remains to hamper welding or painting.

If you have rust prevention problems that need special skills and extra *willingness*, call on Oil Products . . . We would like to duplicate the Budd-American Motors results for you.

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*National Carbon post*

ERNEST S. FRENS
*GE Foundry Dept. post*

JOHN McCORMICK
*Jelrus Precision Casting post*

RAY F. NELSON
*Sandvik-Steel Dept. mgr.*

division sales manager by **Alloys & Chemicals Corp.**, Cleveland.

**Ernest S. Frens** was made manager of manufacturing engineering at **General Electric Co.'s** Foundry Dept., Schenectady, N. Y.

Casting Engineers, Chicago, appointed **John McCormick** plant manager of its newly acquired **Jelrus Precision Casting Co.** plant in New York. He was chief engineer for Casting Engineers.

**Jack Ridella** was promoted to executive vice president, **Swepco Tube Corp.**, Clifton, N. J. **Alfred Ridella** was named purchasing agent, **James G. Harvey** vice president-administrative procedures, **Alfred Friedlander** manager of the Order Dept., **Walter Vincent** assistant manager-Sales Div.

**M. N. Thacker** joined **Luria Bros. & Co. Inc.**, New York, as assistant vice president, alloys and nonferrous metals. He was with Philipp Bros. Ore Corp.

**Ray F. Nelson** was appointed manager, Steel Dept., **Sandvik Steel Inc.**, Fair Lawn, N. J. He was with American Steel & Wire Div., U. S. Steel Corp.

**R. Donald Brown** was elected executive vice president, **Irving Subway Grating Co. Inc.**, Long Island City, N. Y.

**Richard J. Dvorak** was appointed sales engineer for **WaiMet Alloys Co.**, Dearborn, Mich. He will handle sales and provide technical assistance on refractory materials in addition to handling sales of specialized casting alloys. Mr. Dvorak was with Chrysler Corp. as a research metallurgical engineer in charge of foundry operations.

**Christy Karr** was made superintendent of **Colorado Fuel & Iron Co.'s** Palmer Industrial Engineering Dept., Palmer, Mass. **Michael A. Kaschak** joined the Palmer spring mill as chief product engineer, and **Robert K. Cramer** was made superintendent, Palmer plant spring mill.

**Frank H. Vandenburgh** joined **Oregon Metallurgical Corp.**, Albany, Oreg., as vice president and sales manager. He formerly served as president of Mallory-Sharon Metals Corp., and vice president of Hydro-Metals.

**France Q. Wilson** was appointed vice president - marketing, **Waterbury Farrel Foundry & Machine Co.**, Waterbury, Conn., a division of Textron Inc. He was with Solar Aircraft Co., San Diego, Calif., a division of International Harvester Corp.

**M. M. Rand** fills the new post of manager, carbon electrodes and refractories, for **National Carbon Co.**, New York, a division of Union Carbide Corp. He was Eastern division manager-electrode products, Pittsburgh.

**Frank P. Brennan** was made director of technical sales for **Metal Control Laboratories Inc.**, Los Angeles. He was assistant sales manager of United States Testing Inc., Hoboken, N. J.

**Robert K. Hughes**, former steel products manager, **Kilsby-Tubesupply**, Los Angeles, was made assistant sales manager of the company. **Donald L. Byrnes** was made manager of out of state agency sales and structural tubing sales. He was aluminum products manager for Kilsby.

**Edward M. Brabant**, former director of manufacturing, was named assistant to the president of **Blackhawk Mfg. Co.**, Milwaukee.

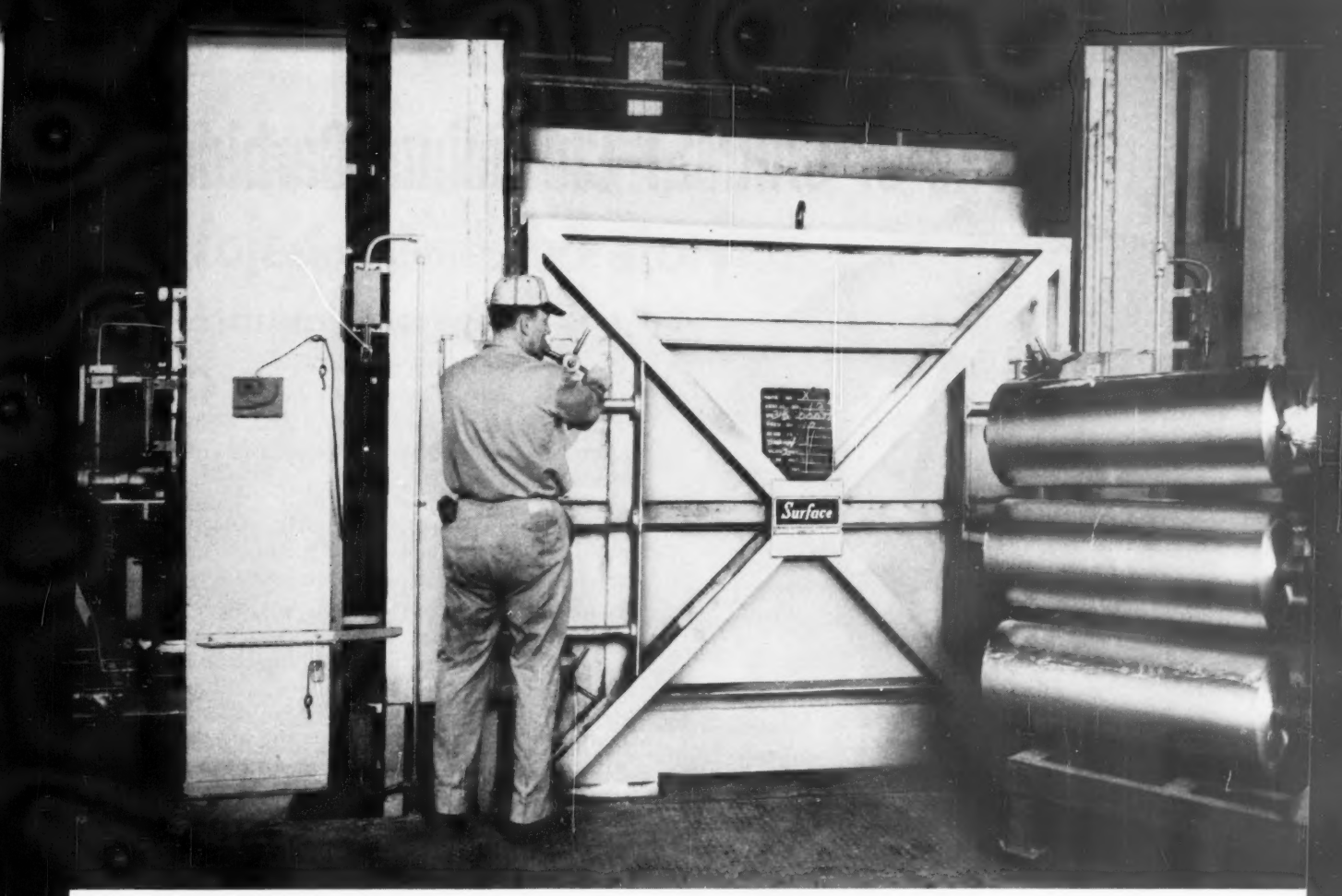
**H. C. Chobanian** was made assistant to the manager of materials, **Allis-Chalmers Mfg. Co.**, Milwaukee. He is succeeded as office supervisor, Purchasing Dept., West Allis, Wis., Works, by **R. A. Pfau.**

## *OBITUARIES...*

**Stanley Kaplan**, 46, president, **M. S. Kaplan Co.**, Chicago, died Aug. 20.

**L. H. Seyfer**, 54, assistant works metallurgist at **International Harvester Co.**, Milwaukee, died Aug. 24.

**Harry A. Feldbush**, 67, retired vice president-engineering, **Worthington Corp.**, Harrison, N. J., died Aug. 28.




# ANACONDA ALUMINUM ANNEALS FOIL WITH LOW-COST UNIFORMITY

## in Surface Power Convection Furnaces

Phenomenal temperature uniformity (never varying more than 5°) and low costs are the profits earned by Anaconda Aluminum with four of these Surface Power Convection furnaces in their Louisville plant.

Each furnace anneals an 8,000-lb. load of coiled aluminum foil in a seven-hour heating cycle. Coils are stacked on racks, as you see here, and fork-lifted directly into the furnaces. Surface DX® generator gas protects the foil during the cycle.

Power Convection* equipment simplifies furnace construction,—just one fan, minimum furnace size for its capacity. This reduces both first cost and operating maintenance. For more data on Surface Power Convection equipment write for Bulletin SC-182. Surface Combustion, 2385 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ontario.

*Trademark of Surface Combustion, Division of Midland-Ross Corp.

Surface® *A division of Midland-Ross Corporation* MR

# Gage Blocks of CARMET Chromium Carbide

## *for new standards of dimensional control!*

For enduring, ultra micro-accurate surface finishes and dimensional stability, CARMET Chromium Carbide represents the ultimate gage block material.

Harder by nature than steel . . . next to a diamond in hardness, yet far tougher . . . Chromium Carbide Gage Blocks withstand rougher use, eliminate costly dimensional errors, and cut frequency of calibration and replacement. They have a thermal coefficient of expansion similar to steel. Fingerprints are not harmful.

Lightweight, non-oxidizing, possessing superior "wringability" and a stable, fine grain structure that takes and holds a mirror-smooth gaging surface . . . CARMET Chromium Carbide in gage blocks is leading the way to rigid new standards of dimensional control.

Carmet doesn't make gage blocks, but furnishes the chrome carbide to the progressive manufacturers who do.

A precise blend of extremely hard, finely divided carbides of chromium with a nickel binder, CARMET Chromium Carbide assures predictable, consistent behavior and unmatched uniformity from piece to piece.

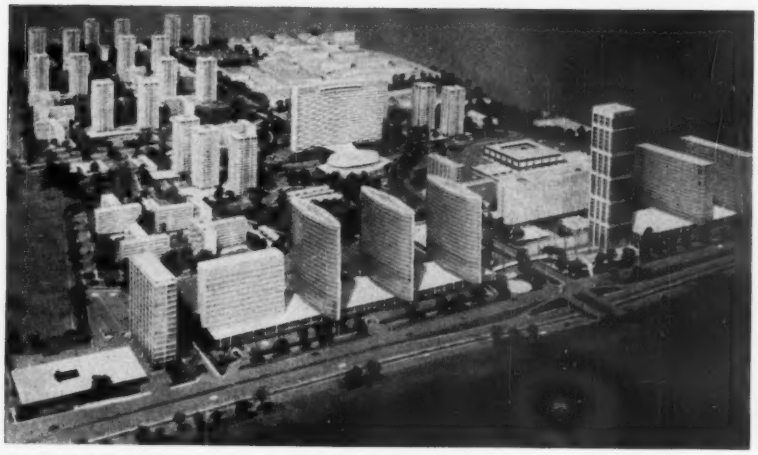
These same unique characteristics make CARMET Chromium Carbide an important material for extrusion dies, valve seats, sealing rings, chemical processing equipment . . . or any other application where resistance to oxidation, corrosion, abrasion, erosion or chemical attack may be involved. For more information, contact your local Allegheny Ludlum CARMET representative, or write: ***Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan.***

1726

**CARMET®** AL

**CEMENTED CARBIDE · DIVISION OF ALLEGHENY LUDLUM**

# Alcoa to Turn Housing Project into Laboratory



**As the community depicted here is developed over the next decade, Aluminum Co. of America will use it as a laboratory to develop and promote new architectural uses of aluminum**

ALUMINUM Co. of America, Pittsburgh, plans to turn a ten year, $250 million urban development project in Los Angeles into a laboratory where it will develop and display innovations of the use of aluminum in architecture.

The community, to be called Century City, will be self-contained. It is designed for 30,000 people. It will consist of apartments, offices, stores, a hotel, and other structures.

Latest engineering and construction techniques employing aluminum will be incorporated as work progresses report Alcoa officials. New aluminum and glass curtain walls are featured in current plans.

Frank L. Magee, president of Alcoa, notes that 21 per cent of the aluminum industry's production is going into architectural products. Some of the newer components include a series of new wall facings, window designs, hung ceilings, floating floors, electrical systems, cooling towers, and interior doors and partitions.

Alcoa and Webb & Knapp Inc., New York, have entered into a partnership to build the community on a tract to be acquired from Twentieth Century-Fox Film Corp.

Directors of Twentieth Century-Fox have entered into a contract, subject to stockholders' approval, for purchase of 265 acres at a cash price of $43 million. The proposal will be voted on at a special meeting on Oct. 17.

Alcoa will participate in the property acquisition through the purchase of interest in 91091 Corp., a Webb & Knapp subsidiary established to acquire the land and to develop the project.

## Crane, Hoist Line Sold

All-State Engineering Co. Inc., Milwaukee, purchased the industrial crane and hoist operation of Borg-Warner Corp., Chicago. It will be housed in a new addition to All-State's Milwaukee plant.

## Casting Shop Enlarged

A machine for casting large, aluminum billets has been placed in operation by Michael Flynn Mfg. Co., Philadelphia, at its plant in City of Industry, Calif. The machine, built by Lobeck Casting Processes Inc., New York, simultaneously casts 24 billets 6 in. in diameter and 20 ft long. Rated capacity: More than 20,000 lb of billets an hour. The firm specializes in producing curtain walls, prime windows, sliding doors, extruded shapes, structurals, and tubing.

## Firm Widens Product Line

Modine Mfg. Co., Racine, Wis., which has been specializing in the production of heating and air conditioning products, is expanding its product line. In the radiation field, it is adding finned tubed radiation and baseboard units. In the air conditioning field, it is adding chilled water type units, and steam, hot water, and electric units that are self-contained. Included among the new items: Electric and industrial vertical unit heaters, and a line of steam specialties and exhaust fans.

## Unit Runs Ore Plant

Cutler-Hammer Inc., Milwaukee, has shipped to an Eastern mill a control center for a new iron ore sintering plant that is 24 ft long, 10 ft wide, and 9 ft high. It weighs 7½ tons. It will permit one operator to weigh, proportion, convey, break up, mix, measure, burn, and cool the materials used in sintering. Measuring and recording instruments are housed in an air conditioned, glass covered enclosure to protect them from heat and dust.

## GE to Build Laboratory

General Electric Co., Schenectady, N. Y., plans to construct a $3 million, 170,000 sq ft laboratory for the study of advanced manufacturing methods. It will consolidate six Manufacturing Services operations now scattered in Schenectady.

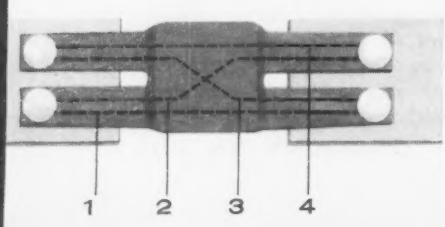
## Installs Cold Rolling Mill

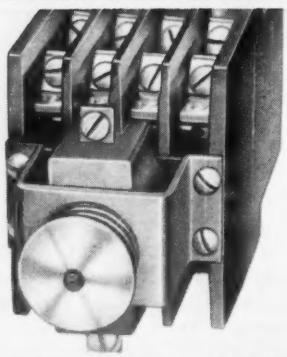
Youngstown Sheet & Tube Co., Youngstown, is installing a 52 in., six stand, four high, tandem, cold reduction mill at its Indiana Harbor (Ind.) Works. It will turn out light gage, tin plate by rolling strip steel at speeds up to 7250 fpm. When installation is completed, the mill will cold roll steel strip in widths up to 46 in. and deliver coils

(*Please turn to Page* 112)

**Another Cutler-Hammer first!** Up to 24 poles in an area less than the size of a dollar bill.

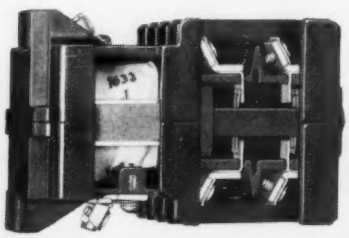
**New contact reliability.** Parallel bifurcated contacts, which allow four current paths instead of one, provide infinitely greater circuit reliability . . . liberally designed so any current path carries full relay rating.



**At last! "Mechanical memory" latch** as reliable as the relay itself! No adjustment ever needed. Add latch at any time.

**New simplified design!** Cutaway view shows basic simplicity. Coil vacuum impregnated to resist damage from humidity, vibration, electrical stress. Terminals can be screw or spade type.



# Space savingest relay you've ever seen: New Cutler-Hammer "Compact 300"

*Versatile 300 V. control relay is so reliable it's permanently sealed!*

Here is the best answer yet to the need for an extremely reliable, small-size 300 V, 6 amp., industrial relay — the new "Compact 300" from Cutler-Hammer.

Every detail known that affects relay reliability has been improved in the "Compact 300." Bifurcated contacts which make possible *four* current paths rather than one, add millions of operations to the "Compact 300's" electrical reliability.

In fact, we're so confident of its electromechanical reliability, we permanently enclose the "Compact 300." And, if it should be damaged by a fault current, you throw it away and replace it with a new one. Its low price makes this an economical, practical maintenance procedure.

Now think of the space you can save with the "Compact 300." It controls up to eight circuits in panel space only 2″ wide by 2¾″ high. 2, 3, 4, 6 and 8 poles with any combination of N.O. or N.C. contacts are available, of course.

At any time, you can add "mechanical memory" latch with a life equal to the life of the relay. No adjustments are ever necessary. Contact your Cutler-Hammer distributor for details on the "Compact 300" or send for Pub. ED-L079-S213.

**What's new at Cutler-Hammer?** New, better products, like the 300 V. relay are coming steadily from our new, expanded plant facilities. We're ready now to help you take care of the great industrial growth of the future. If you are planning ahead and need electrical control assistance, contact the nearest Cutler-Hammer sales office.

*WHAT'S NEW? ASK...*

**CUTLER-HAMMER**

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

***You get greater strength . . . with***

**SHENANGO CENTRIFUGAL CASTINGS**

Downtime, rejects, heavy maintenance costs and too-frequent replacements can be cut down *appreciably* by the use of Shenango extra-strong centrifugal castings.

They provide a finer, *pressure-dense* grain . . . with all the weakening defects eliminated, such as blowholes and sand inclusions.

Though built to stand the most rugged service, each Shenango casting is precisely-dimensioned to your exacting requirements. Whether you need rolls, bearings, bushings, mandrels, sleeves, liners, or any other essentially symmetrical part . . . *specify Shenango* for greater strength, greater wear-resistance, greater lasting power and greater savings, year after year.

Informative bulletins are yours for the asking. Write to: *Centrifugally Cast Products Division,* The Shenango Furnace Company, Dover, Ohio.

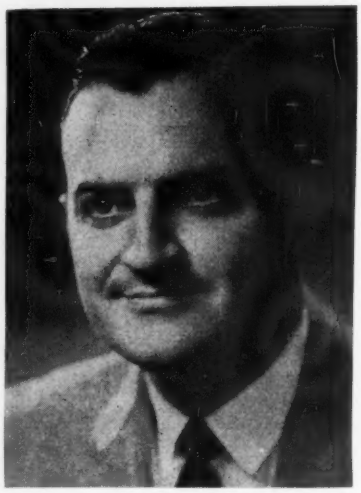
**SHENANGO** CENTRIFUGAL CASTINGS

COPPER, TIN, LEAD, ZINC BRONZES • ALUMINUM AND MANGANESE BRONZES
MONEL METAL • NI-RESIST • MEEHANITE METAL • ALLOY IRONS


(*Concluded from Page* 109)

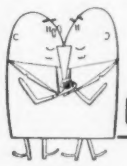
80 in. in diameter, weighing more than 62,000 lb. Power provided for the main drives is 34,900 hp. The mill was manufactured by Mesta Machine Co., Pittsburgh.

## Company Formed in Canada



GERALD M. WOOD

Peterson Steel Inc., Union, N. J., announced the formation of Peterson Steels (Canada) Ltd. Offices will be at 150 Englinton Ave., East Toronto, Ont. The company will promote the sale of 52100 bars, tubes, and forgings, and cold rolled, high carbon steel. Mr. Wood was named general manager.



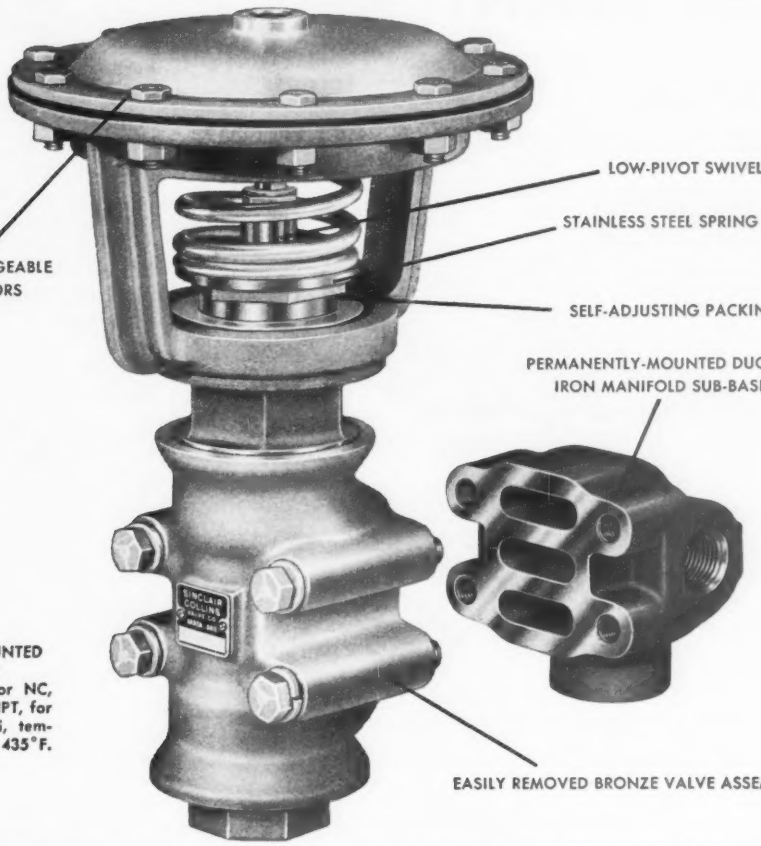
## CONSOLIDATIONS

**H. W. Loud Machine Works Inc.,** Pomona, Calif., bought the business and principal assets of the USI Montebello Div. of **U. S. Industries Inc.,** New York. The plant has been producing landing gear and other aircraft components. The sale includes 200,000 sq ft of plant and 20 acres of land. The facility will continue to operate with the same personnel in engineering, design, and production.

**McKay Machine Co.,** Youngstown, purchased **Berkeley Co.,** Danville, Ill., producer of automatic arcwelding equipment. McKay builds sheet

# NEW—SINCLAIR-COLLINS

## 1/2" manifold-mounted steam valve




**S-C MANIFOLD-MOUNTED STEAM VALVE**
2- and 3-way NO or NC, tapped ½- or ¾-in. NPT, for pressures to 350 psi, temperatures from 0 to 435°F.

Want excellent flow characteristics and bubble-tight sealing? Want maximum service life and minimum downtime for maintenance? Want compact, versatile design and ease of installation? Then you'll specify Sinclair-Collins' new manifold-mounted steam valve.

S-C's low-pivot hollow swivel stem places the pivot point *within* the extra-long bearing area to minimize side thrust and wear . . . provides maximum packer life. Self-adjusting spring-loaded Teflon chevron packing requires no attention. Piloting of all assembled components eliminates misalignment of stem. These features, plus Sinclair-Collins' precision manufacturing techniques are your assurance of long trouble-free valve life.

What's more, S-C's new valve can be converted from NO to NC, or vice versa, by rotating it 180° on the manifold sub-base.

Some day, maintenance will be necessary . . . it's simple . . . just loosen four mounting bolts, remove the valve for later bench servicing and install a replacement . . . downtime can be measured in minutes!

Find out how this advanced design valve can improve the performance of machines you have in service or on the drawing board. Your Sinclair-Collins field engineer has all the details.

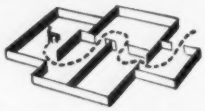
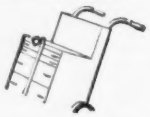
*For more information, write for free Bulletin MV-60. Address The Sinclair-Collins Valve Company, 454 Morgan Avenue, Akron 11, Ohio, Dept. ST-960.*

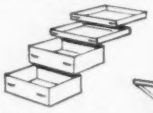
**The SINCLAIR-COLLINS VALVE Co.**
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

8128

# FOLLOW THIS MAN!

*He's saving time with a new Snap-on Tool Truck*

Up a stairway on a hurry-up job, nothing to it with the big, 10-inch diameter, semi-pneumatic balloon tires. Emergency repair work across the plant,  compact Tool Truck carries full tool selection to the job. Job in another building, the Tool Truck eases heavy loads over rough pavements or tracks. Drawers are held shut during travel by a padlocked bar. 

The new *Snap-on* Tool Truck is invaluable wherever tools or parts transport is needed. Plenty of tool space with four husky drawers.  Upper panel section is partitioned for nuts, bolts, parts. Ample storage space throughout.


**A demonstration will prove the Tool Truck's money-saving ability. Call your nearest *Snap-on* branch or write us direct.**

*FOR ALL INDUSTRY*

**SNAP-ON TOOLS**

8121-I 28th AVENUE • KENOSHA, WISCONSIN


and coil processing equipment. Officers of Berkeley include: President, A. J. Wardle Jr.; secretary-treasurer, F. H. Dreher; vice president and operating head, R. T. Klempay; and assistant treasurer, E. W. Farmer. McKay is negotiating for purchase of Federal Machine & Welder Co., Warren, Ohio, and its subsidiary, Berkeley-Davis Inc., Danville, Ill.

**J. M. Nash Co. Inc.,** Milwaukee, acquired **State Foundry & Machine Inc.,** Cedar Grove, Wis., producer of gray iron and Ductile iron castings. No changes are planned in the operation or management of the firm. Edward M. State will continue as president, Bernard L. Stott as vice president.

**Perkins Machine & Gear Co.,** West Springfield, Mass., acquired the entire inventory of standard stock, spiral gears from **Gleason Works,** Rochester, N. Y. The purchase includes finished stock, drop forgings, and engineering specifications.

**Nuclear Metals Inc.,** Concord, Mass., acquired **Crowell Tube Co. Inc.,** Lexington, Mass., producer of small diameter metal tubing. Officers of the new Nuclear subsidiary include: President, H. Hugh Willis; treasurer, D. E. Donnelly; and secretary, P. J. Thompson. Malcolm Young is production manager; E. S. Holden, sales manager.

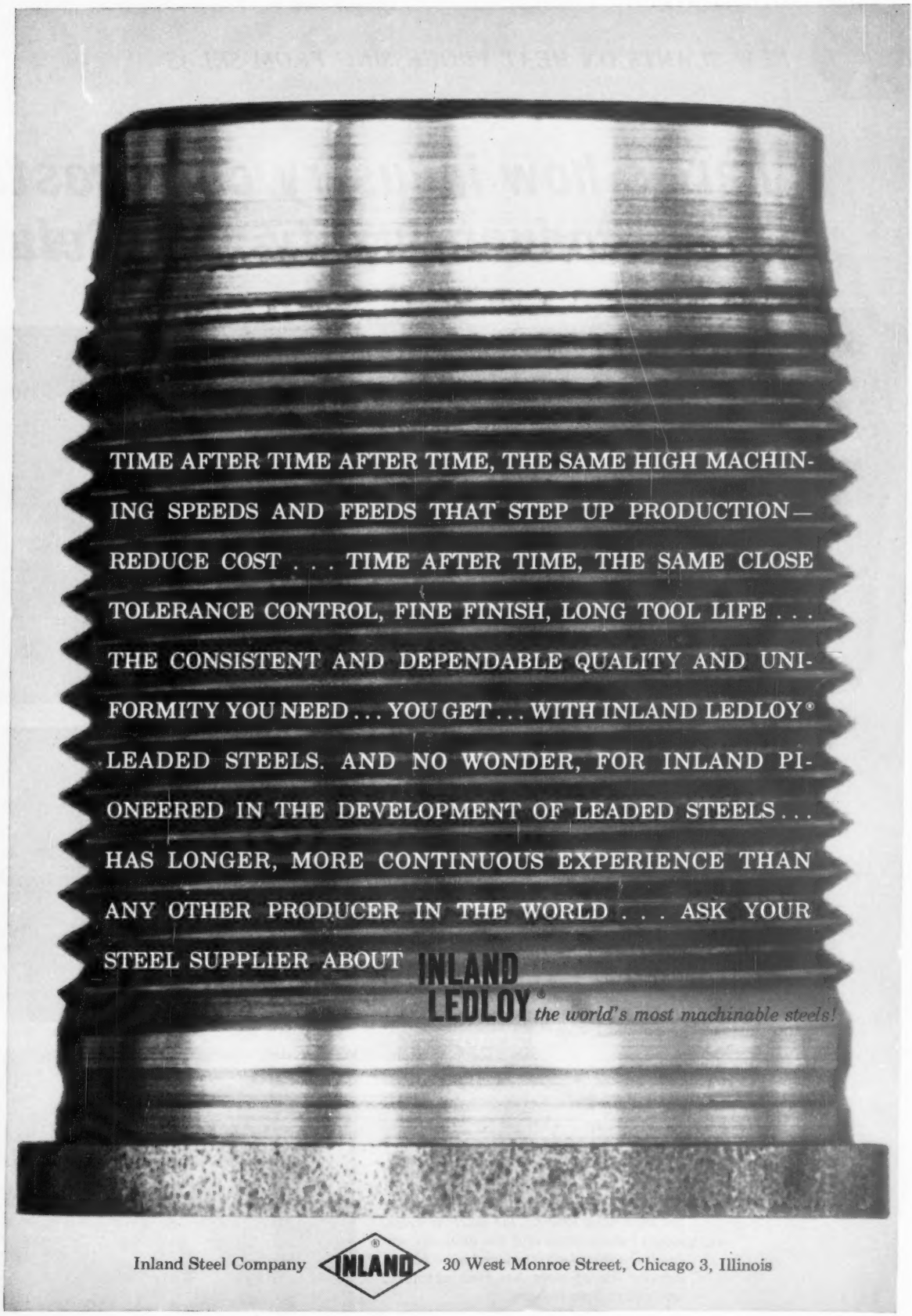
**Branson Instruments Inc.,** Stamford, Conn., acquired **Colin Campbell Co. Inc.,** Danbury, Conn., manufacturer of transformers, toroids, and other electronic devices. Branson has also obtained a half interest in Radionics Inc., Norristown, Pa.

**Keystone Engineering Co.,** Los Angeles, has acquired a controlling interest in **Western Arc Welding Inc.,** that city, specialist in precision welding of exotic metals. E. T. Sherrick is in charge as vice president and general manager.

## NEW ADDRESSES

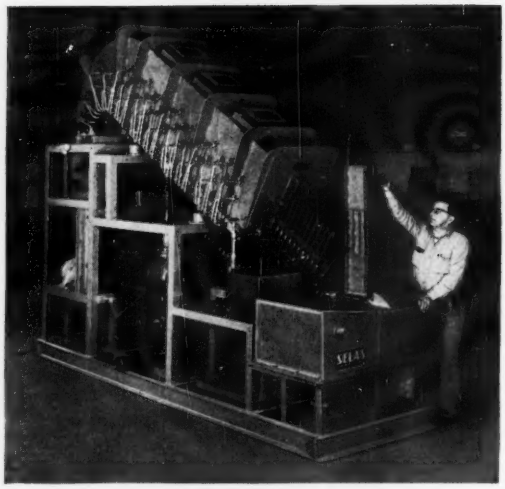
**Clark Equipment International C. A.,** subsidiary of Clark Equipment

(*Pease Turn to Page* 118)

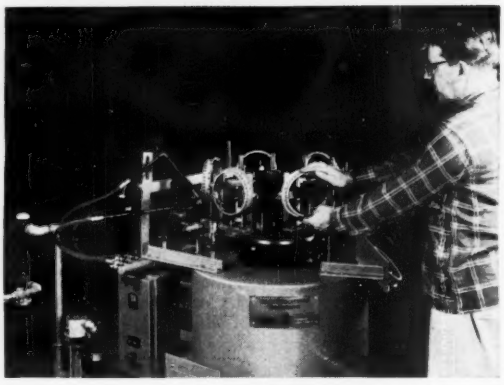

TIME AFTER TIME AFTER TIME, THE SAME HIGH MACHINING SPEEDS AND FEEDS THAT STEP UP PRODUCTION—REDUCE COST . . . TIME AFTER TIME, THE SAME CLOSE TOLERANCE CONTROL, FINE FINISH, LONG TOOL LIFE . . . THE CONSISTENT AND DEPENDABLE QUALITY AND UNIFORMITY YOU NEED . . . YOU GET . . . WITH INLAND LEDLOY® LEADED STEELS. AND NO WONDER, FOR INLAND PIONEERED IN THE DEVELOPMENT OF LEADED STEELS . . . HAS LONGER, MORE CONTINUOUS EXPERIENCE THAN ANY OTHER PRODUCER IN THE WORLD . . . ASK YOUR STEEL SUPPLIER ABOUT INLAND LEDLOY® the world's most machinable steels!
Inland Steel Company
INLAND
30 West Monroe Street, Chicago 3, Illinois

*NEW SLANTS ON HEAT PROCESSING FROM SELAS*

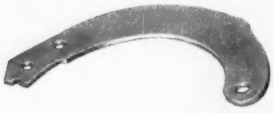
# *here's how industry cuts costs product quality with Selas*

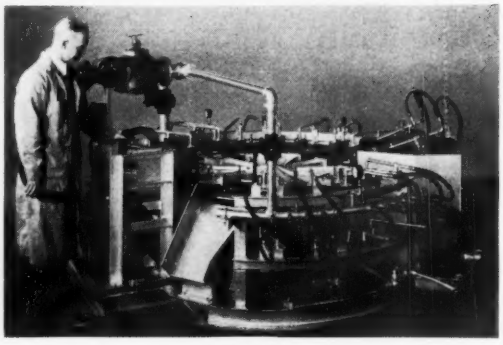


**FORGING** *Continuous unit fits compactly into production line to heat alloy steel bars for forging into C-shaped rail anchors. Production is synchronized with the forging bulldozer, up to 620 bars per hr. Inventory of work-in-process is ⅓ to ¼ of previous equipment . . occupies 20% less floor space . . reduces scale 95%. Precise heating assures consistently uniform grain structure and hardness.*



**BRAZING** *Compact machine automatically silver brazes Carboloy cutter to stainless steel shredder ring used in garbage disposal units. Precise fixturing, localized high-speed heating and automatic unloading permits one operator to produce up to 200 pieces per hr. . . Completely shop-assembled at Selas, unit was installed in customer's plant, ready for production operations, within hours.*





**SELECTIVE HARDENING** *End portions of brake shoe webs are hardened to create a more durable product. An indexing conveyor brings the two ends of webs under Duradiant burners. Designed for automatic loading, the machine heats, quenches, tempers and mechanically unloads the selectively-hardened work pieces. Service life of webs has been extended, costs have been reduced.*

# . . . improves heat processing equipment

**ANNEALING** *Six-station dial conveyor automatic machine anneals a narrow band on stainless steel auto hub caps. Workpieces rotate above burners, bringing 2-in. wide band to 1800°F. in 30 sec. Production is 600/hr. Only 6 ft. 6 in. in diam., unit is located directly in the press shop production line.*

The installations on these pages demonstrate how Selas automatic heat processing equipment

- cuts operating costs
- increases production rates
- minimizes in-process inventory
- reduces labor requirements
- saves valuable floor space
- improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. Problems usually associated with divided responsibility are avoided since Selas starts-up and services every machine it designs and builds.

Selas automatic or semi-automatic heat processing equipment can help you produce better products at lower costs. At your convenience—without obligation to you—a Selas field engineer would welcome the opportunity to survey your requirements.

For this free, personal service, or for literature on any of the heating operations shown here, write Mr. W. B. Troupe, General Industry Division.

*SELAS CORPORATION OF AMERICA*
29 Dreshertown Road, Dresher, Pa.

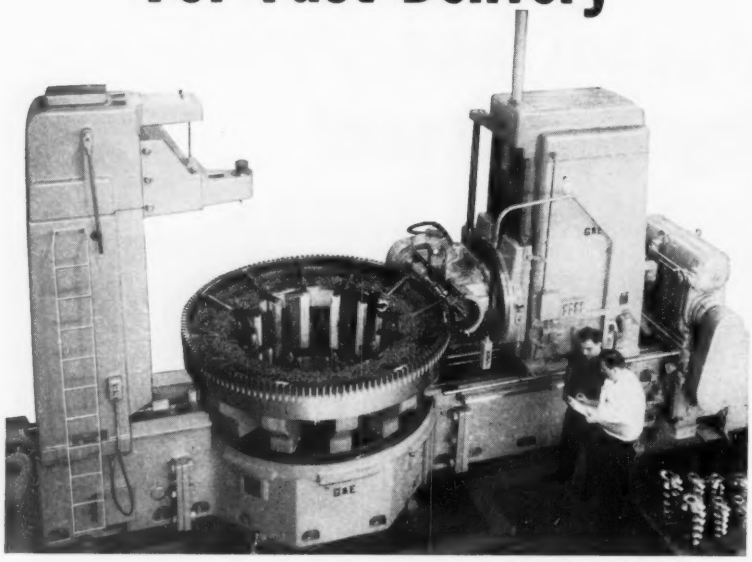
EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S. A., Pregny, Geneva, Switzerland. INTERNATIONAL REPRESENTATIVES AND LICENSEES: CAMBODIA, FORMOSA, KOREA, LAOS, VIETNAM—Cosa Export Co., Inc.; JAPAN—International Machine Co., Ltd., Tokyo; FRANCE—Societe Exploitation de Produits Industriels, Paris.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS

***DEVELOPMENT***
•
***DESIGN***
•
***CONSTRUCTION***

# New Production Capacity For Fast Delivery



# Large Generated Gears

## SPUR • HERRINGBONE • HELICAL

## for a wide range of industrial applications

Gears which must operate smoothly and without vibration at higher speeds and under greater loads must correspondingly be more accurate in tooth profile and spacing.

H & S Generated Gears answer these demands.

Offering the same high-quality standards which characterize the complete H & S Gear line, production capacities for large generated Spur, Helical and Hobbed-Herringbone Gears are now available in the following dimensions:

Up to 80″ outside diameter at 1 DP
Up to 90″ outside diameter at 1¼ DP
Up to 100″ outside diameter at 1½ DP
Up to 125″ outside diameter at 2 DP
Face widths up to 42″, depending on helix angle

Send your specifications, or let our technical staff make recommendations. H & S specializes in fast production of quality industrial Gearing and Speed Reducers to meet your custom requirements.

*Write for Catalog FLB-60*

H&S **The HORSBURGH & SCOTT CO.**

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(*Concluded from Page* 114)

Co., Buchanan, Mich., moved its headquarters from Havana, Cuba, to Centre International Rogier, Brussels, Belgium. The European district office in Brussels has been moved to the same address.

**Milwaukee Crane Div.,** Novo Industrial Corp., Cudahy, Wis., is moving its Chicago district sales headquarters to 9705 Cottage Grove Ave. in that city.

**Square D Co.** moved its corporate executive offices to Executive Plaza, Park Ridge, Ill.

**Olin Mathieson Chemical Corp.,** New York, transferred its Pacific Coast district headquarters to 3243 Wilshire Blvd., Los Angeles, Calif. R. R. Johns is district manager, aluminum field sales.

## NEW PLANTS

**Vulcan Detinning Div., Vulcan Materials Co.,** Birmingham, will construct plants in Houston and Los Angeles. Products offered will include high grade steel scrap and electrolytic tin.

**Square D Co.,** Park Ridge, Ill., manufacturer of electrical distribution and control equipment, opened an assembly plant in Los Angeles.

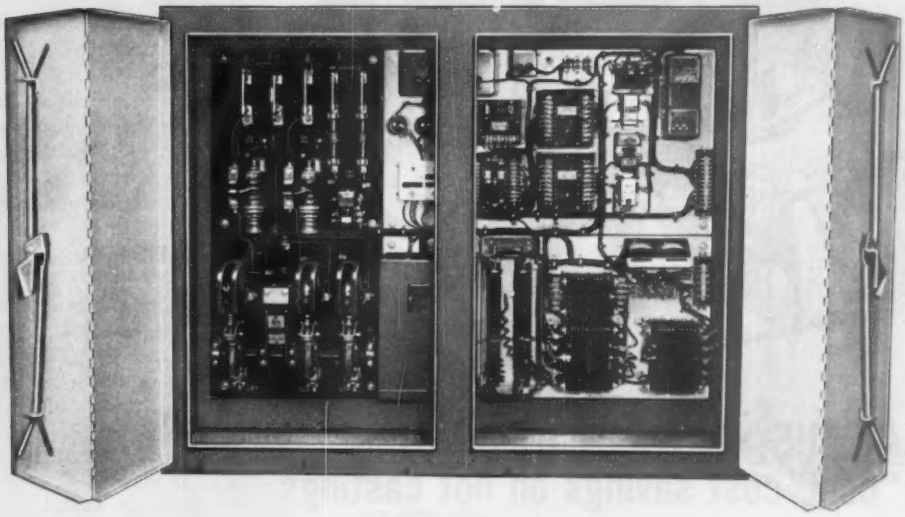
**Simpson Electric Co.,** Chicago, has opened a new plant to fabricate plastic parts at Lac du Flambeau, Wis.

**Federal Pacific Electric Co.,** Newark, N. J., is building a 175,000 sq ft building at Des Plaines, Ill. It will house four company operations: Regional sales offices and Midwestern redistribution warehouse; Cornell-Dubilier's area sales office and central redistribution warehouse; Economy Fuse manufacturing operations; and Economy Screw Corp.

**Bridgeport Brass Co.,** Bridgeport, Conn., opened a metals center at 1613 W. 21st St., Tulsa, Okla. P. E. Mason is district manager.

**Cooper-Bessemer of Canada Ltd.,** reopened its marine gas and diesel

# New EC&M AC **STATA-Hoist** Control gives PRECISION HANDLING OF ALL LOADS!



EC&M's New STATA-Hoist is an AC Reactor Hoist Control which provides the ultimate in load-handling accuracy. STATA-Hoist Control offers these outstanding advantages:

**Stepless Control** with *FAST* response over the entire speed range—both hoisting and lowering

**Float Control,** actuated by a pushbutton in the master switch handle, permits ultra-fine speed control in the slow speed range...both hoisting and lowering

**Static Components** with encapsulated sub-assemblies for reliable operation with minimum maintenance

**No Mechanical or Electrical Load Brakes**

**Tachometer Generator** and overspeed switch are assembled as a unit for easy mounting

**Fewer Collector Bars** than any other system

**Unitized Secondary Resistor—Reactor** eliminates secondary contactors and accelerating relays. Mounted on trolley, eliminating secondary collector bars (rail)

**Extra Safety**—a fail-safe tachometer feedback circuit will remove power and set brake if an open circuit occurs. Standard Youngstown Limit Stop provides over-hoisting protection without any additional equipment

**Simplified Maintenance**—the encapsulated sub-assemblies make for an easily understood circuit and provide convenient test points

**Front-connected Control Panels** incorporate full motor protection

**EC&M's STATA-Hoist Control** is available for hoist, bridge and trolley motions

***GET THE COMPLETE STORY!*** *Write for Bulletin 6401. Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio*

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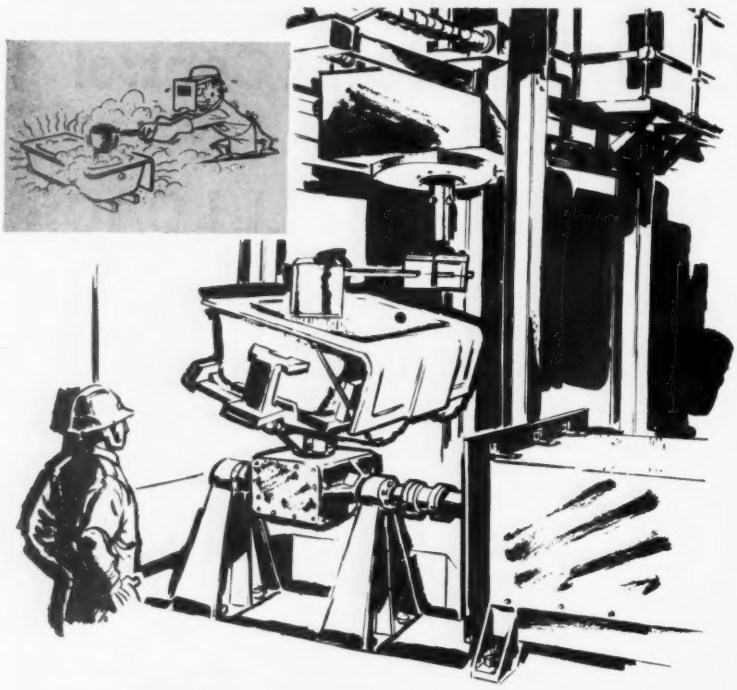
5351

*New twists in programmed manipulation from General Mills*



## BEAT THE HEAT! Mechanical Arm effects "cool" cost savings on hot castings

*Now* there's a way to free workers of drudgery, danger and boredom inherent in many industrial tasks... *and* save you money! Plumbing fixture manufacturing provides one example.

Cast iron bathtubs are generally enameled by sprinkling powdered glass on the 1750° heated castings. It has required the skill of master enamelers . . . using age-old manual techniques. It's mighty hard on men . . . and rejects are expensive. Today, a General Mills' Mechanical Arm coupled with an analog controller can perform the five simultaneous motions for uniform application of the enamel finish. Initial instructions are recorded on a plastic chart by manual operation of the master console. Thereafter, electronic playback duplicates hand enameling tirelessly and without human error.

General Mills' Mechanical Arms possess a unique blend of gargantuan strength and watchmaker's dexterity that's ideal for hard-to-handle jobs. Controller flexibility permits low-cost change of instructions for inline production at other stations . . . or switch to manual remote control.

Get the new booklet *Automatic Handling* for principles of programmed manipulation. Write: *General Mills, Nuclear Equipment Dept., 419 North Fifth Street, Minneapolis 1, Minnesota.*

NUCLEAR EQUIPMENT DEPARTMENT

General Mills

*First in Remote Handling*

**MECHANICAL ARMS**

engine warehouse at 2 Prince St., Halifax, N. S. The firm is a division of Cooper-Bessemer Corp., Mt. Vernon, Ohio. Manufacturing facilities were leased recently at Stratford, Ont.

**Miller Steel Co. Inc.,** Hillside, N. J., has a new office and plant site. Inventories will be enlarged and new products added when the new plant is occupied. Miller is a distributor of steel and aluminum to the New Jersey, New York, and Connecticut areas.

**F. W. Derbyshire Inc.** is building a 10,000 sq ft structure in Bear Hill Park, Waltham, Mass. The firm will move its entire facilities from present quarters on High Street, Waltham, to the new location in the fall.

**Champion Pneumatic Machinery Co.,** Princeton, Ill., has expanded capacity with a 50,000 sq ft plant 1 mile from the main plant. At the main plant, new offices, and an engineering and drafting room have been added.

**Affiliated Screw Products Co.,** Schiller Park, Ill., has consolidated three of its plants into a new 50,000 sq ft plant.

## ASSOCIATIONS

**The Copper Products Development Association Inc.,** Columbus, has admitted eight members: Cerro de Pasco Corp., Chibuluma Mines Ltd., Copper Range Co., Falconridge Nickel Mines Ltd., Magma Copper Co., Mufulira Copper Mines Ltd., Noranda Mines Ltd., and Roan Antelope Copper Mines Ltd. A total of 25 companies represents mining operations in the U. S., Canada, South America, Africa, and Australia.

**Farm Equipment Institute,** Chicago, elected these officers: President, Hubert L. Byrd, Food Machinery & Chemical Corp., San Jose, Calif.; and chairman of the executive committee, W. G. Scholl, Allis-Chalmers Mfg. Co., Milwaukee.

IDEAL

# SPECIFIES KEYSTONE WIRE FOR WIRE CONNECTORS

"We use Keystone MB Spring Wire because we know our spring coils will meet rigid specifications. That is the secret of the success of our solderless wire connectors," says Paul Cherry, Plant Superintendent of Ideal Industries, Inc., at the Petersburg, Illinois, plant.

Ideal Industries were the original designers and manufacturers of wire connectors for electric wiring in appliances and home construction. Their "Wire-Nut"* connector with a copper-coated conical spring, securely contained in a plastic cone, is the standard for electrical contractors the world over.

Ideal, a major supplier to world markets, emphasizes quality control by continuous inspection of their tiny wire spring coils.

Keystone's metallurgical and research engineers worked closely with Ideal Industries, Inc., to develop a special MB Spring Wire for its product. Close diameter tolerance, uniform temper throughout the coil, special surface for copper and cadmium plating and lubricant qualities for high-speed production were the results of this research effort.

Delivery is made in moisture-proof fiber drums for protection of plating quality finish during shipment or storage.

Take a cue from Ideal Industries and let Keystone solve your wire problems. Call your Keystone Wire Representative soon or write us for details; we will be pleased to help you.

*Keystone Steel & Wire Company, Peoria 7, Illinois*

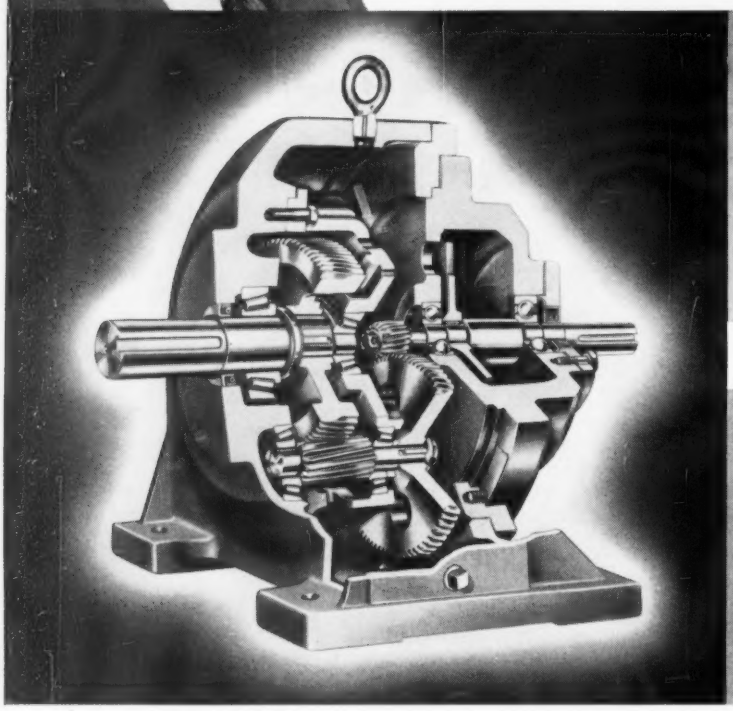
**KEYSTONE**

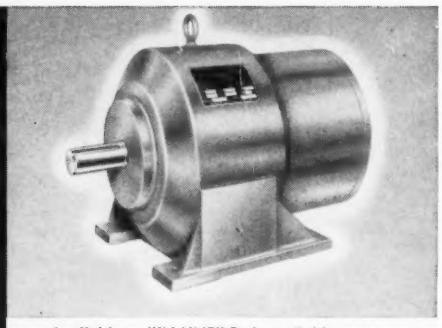
WIRE FOR INDUSTRY

*Reg. TM Ideal Industries, Inc.

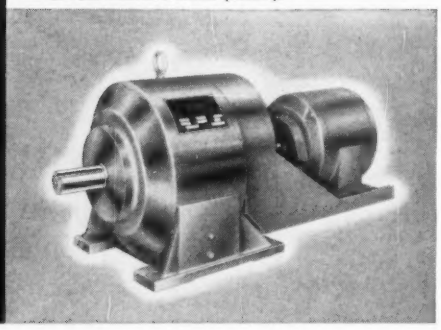
# "Buying at Philadelphia Gear, I get the benefit of this simple formula..."

## IMPROVED GEARS = [LONGER LIFE / MORE POWER]





Available as "IN-LINE" Reducer (left), or as a GearMotoR with flange mounted motor (above) or foot mounted motor (below).



**The gearing in these drives is case hardened and precision ground, an advanced development that out-dates conventional standards and ratings. You get commercial drives with gearing of master gear quality at a cost no greater than conventional drives now in use. They are available in standard sizes to 200 H.P.**

**LONGER LIFE**
Extreme accuracy of tooth profiles, profile spacing and surface furnish eliminates "running-in" wear.

**MORE POWER**
Harder materials, plus reduced load factors means the reducer can transmit more power, operate at higher speeds.

**SPACE AND WEIGHT SAVINGS**
Reduced load factors also mean less space and weight without sacrificing performance characteristics.

**REDUCED VIBRATION**
Reduced tooth to tooth errors, accumulated pitch errors and total composite errors give smoother contact.

**REDUCED SOUND LEVELS**
For applications where low sound levels are important, gear noise is no longer a controlling factor.

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# philadelphia gear drives

**PHILADELPHIA GEAR CORPORATION**

King of Prussia (Suburban Philadelphia), Pennsylvania

# Technical Outlook

**AUTOMATED FORGING—** Engineers at National Machinery Co., Tiffin, Ohio, are developing a mechanical handling unit for a forging press which will load, unload, and move heated billets from station to station. It's being made to demonstrate the feasibility and economy of automatic handlers.

**NEW TEST FOR IRON—** A French radiochemical method for determining the purity of iron is said to be more sensitive and accurate than standard analytical procedures used in the U. S. It was developed by a team of researchers of Laboratoire de Vitry, du Centre National de la Recherche Scientifique, one of the leaders in high purity iron research.

**SPREAD IT ON—** A process for putting zinc or other metals on part surfaces doesn't require plating current, says Minnesota Mining & Mfg. Co., Minneapolis. Requirements: Metal powder, a promoting agent, glass beads (impact medium), and a rubber-lined tumbling barrel. Advantages are said to include low equipment cost and elimination of hydrogen embrittlement. Thickness can be controlled.

**HIGH TEMP ALLOY—** Better high temperature performance at lower cost is claimed for a new alloy (No. 56) by Haynes Stellite Co., a division of Union Carbide Corp., New York. At a load of 20,000 psi at 1800° F, performance cost is claimed to be half that of other popular materials in use.

**NEW TEST FOR CRACKING—** Circular test patches may be accurate enough to predict crack proneness of welds in armor plate, says the *Welding Journal*, New York.

**MACHINERY NOTE—** "We should become more aware of the imagination foreign machine tool builders are putting into their products," many investigators tell STEEL. Sig Rudorf, A. O. Smith Corp., Milwaukee, cites this example: A 40 ft boring mill has a small concentric table which can be uncoupled to permit faster turning on smaller work. Tables also have built-in thermocouples tied to alarms which warn of overheating.

**MORE CORROSION RESISTANCE—** A chromium plating crisscrossed with microscopic cracks shows promise of "phenomenally improving" corrosion resistance when applied over copper and bright nickel, claims Battelle Memorial Institute, Columbus, Ohio. The procedure calls for small additions of selenic acid in the chromic acid bath.

**STEEL CODES CHANGED—** Committees at the annual meeting of the American Society for Testing Materials, Atlantic City, N. J., adopted new specifications for steels in these areas: 1. Carbon steel plates with improved transition properties for boilers and pressure vessels. 2. High strength, low alloy, vanadium-manganese steel for welded bridges. 3. A new method for testing notch toughness of turbine and generator steel forgings.

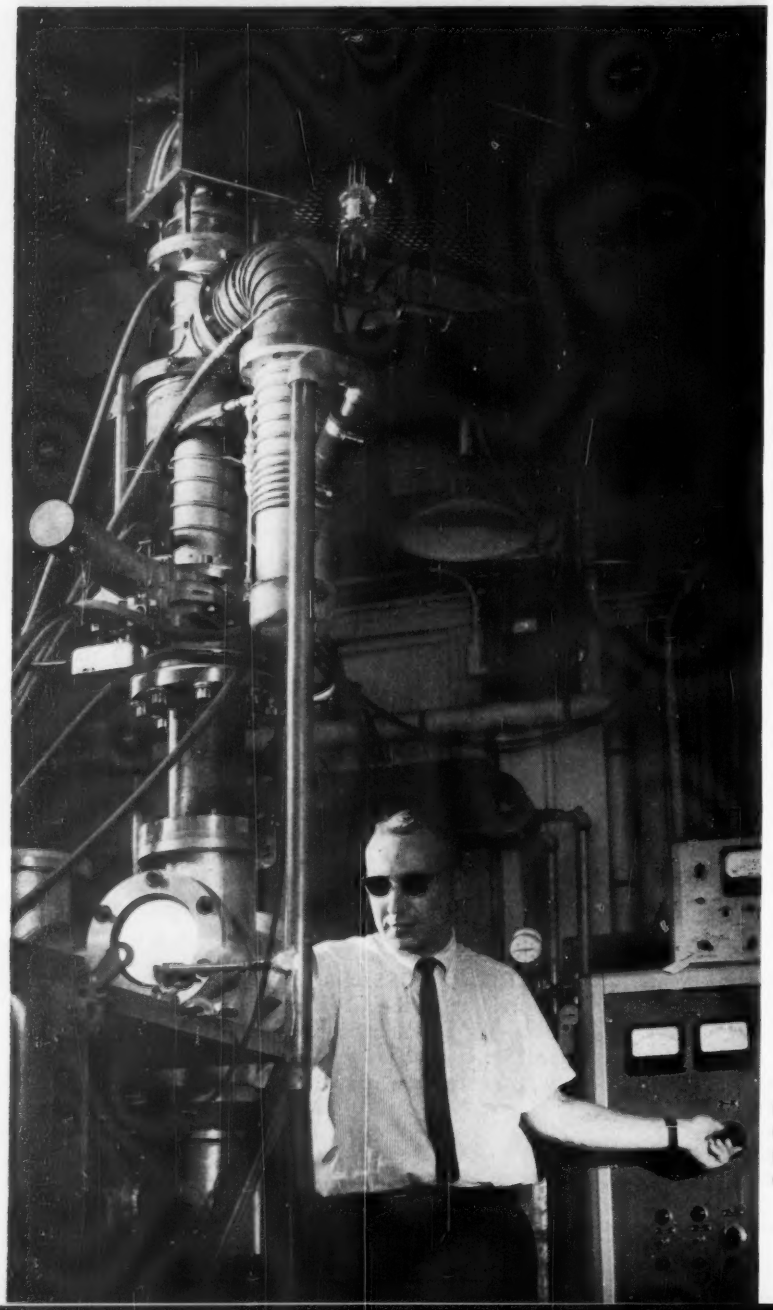
**ELECTRON BEAM TESTS—** Welding of molybdenum and tungsten by an electron beam may be the answer to joining such metals in space and missile structures, the Air Force thinks. Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., has a contract to study techniques and equipment.

**SURFACE AFFECTS STRENGTH—** The yield point of a metal is affected greatly by surface condition, claims a metallurgy group at the Research Institute for Advanced Studies (RIAS), Baltimore. "Dislocations are readily produced from surface defects. But when they are removed by chemical polishing or locked by a coating, yield values can increase as much as 60 per cent."

**WELDING IN RUSSIA—** "By 1965, 40 per cent of all welding in the USSR will be mechanized," predicts W. E. Paton, a German who recently visited Soviet installations. One device hard surfaces large components with six electrodes.

# Electron Beam Methods Move into Production

**Experts see a growing market for metalworking equipment. They're predicting a potential for over $100 million worth of welding equipment alone**



**ELECTRON BEAM metalworking is being graduated to production.**

It's being used in the purification of metals (especially refractory metals), in welding, and in machining.

Definition: Electron bombardment is simply a pure, highly efficient heat source. Electrons are radiated from a filament (normally tungsten) and accelerated electrically. Streaking through a vacuum at speeds as high as 100,000 miles a second, the electrons strike the surface of a workpiece, and the energy converts almost directly to heat.

The heat can be used to melt metals, or to weld them; or it can be used to vaporize tiny areas so parts of the work are "machined" away.

● **Electron beam metalworking relies on two primary advantages, freedom from contamination and precision of control, plus a scattering of others.**

The electron beam source and the work are mounted in vacuum chambers in which pressures reach $10^{-4}$ to $10^{-5}$ mm of mercury. In that environment, foreign particles are practically nonexistent, and the beams have a clear path to the work, dissipating none of their energy on the way.

In addition to giving the electrons a faster track, there's another advantage that's pointed up by A. Lesnewich, supervisor, welding and joining metallurgical research, Air Reduction Co. Inc., Murray Hill, N. J. He says: "The amount of reactive gas in a vacuum of $10^{-5}$ mm of mercury is about the same as that which would be present in an inert gas shield of 99.999999 per cent purity. A gas shield of that purity for arcwelding reactive metals is not commercially feasible at this time."

So the heated metals don't pick up stray contamination—in fact, they are likely to lose impurities in the process, whether it's melting or welding.

The second advantage, positive control over all process variables, creates a near paragon of efficiency. The power of the electron beam can

**Designer Stanley Noesen shows the electron beam furnace (60 kw) GE is using for metallurgical study on metal purification**

## WELDING

MOST experts predict that welding will be applied more generally than any of the other electron beam processes.

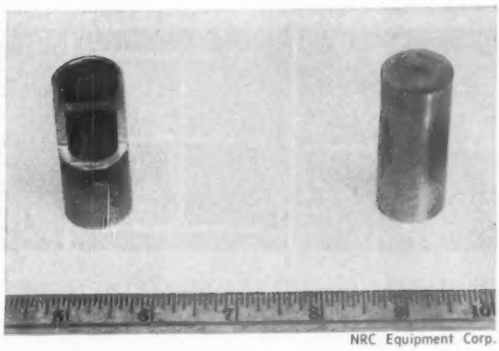
In addition to the development work being done by both equipment makers and users, several commercial installations are at work. At Westinghouse Electric Corp.'s Bettis Atomic Power Laboratory, the technique has replaced tungsten, inert gas welding in the manufacture of Zircaloy-2, nuclear fuel assemblies. Engineers have made welds in ¼ in. thick metal at 10 in. a minute—0.10 in. deep welds at 30 ipm. Shrinkage and thermal distortion are minimal. Elimination of special spacers, reduced machining, and the absence of straightening have cut direct labor costs on welding by about 40 per cent.

A second installation: Rosemont Engineering Co., Minneapolis, will use a welder, designed and built by Air Reduction Sales Co., a division of Air Reduction Co. Inc., New York. The machine will be used to weld structures and parts for the missile, electronics, and aircraft industries. Future applications are expected for other industries, including automotive. One of the company's first jobs: Weld tungsten to molybdenum for an intricate magnatron cathode tube.

● **First Decision**—Two distinct types of electron beam welding equipment are available. Relatively low voltage types (to 50 kilovolts) often cost less than half as much as the high voltage (to 150 kilovolts) units. The circuitry also is less complex, simpler to maintain on low voltage units. All the advantages of vacuum welding are present.

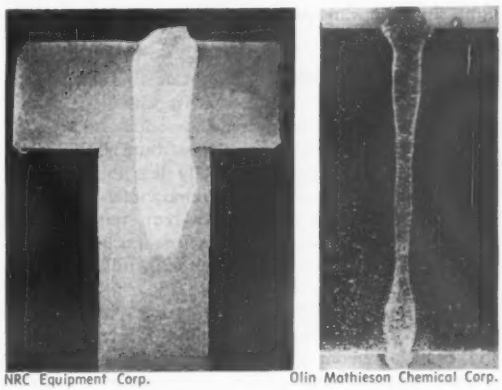
The high voltage units are capable of finer focus of the beam (the spot can be as fine as 0.005 in. in diameter vs. a minimum of 0.010 for low voltage), greater weld penetration, and higher ratios of depth to width ratios (20 to 1 vs. about 4 to 1). Disadvantages of price and circuit complexity are offset by greater weld concentration, which can mean less distortion and shrinkage.

● **Metals to Weld**—"We are convinced that we can hang two pieces of any metal together," says one expert at Hamilton-Standard Div., United Aircraft Corp., Windsor Locks, Conn. (U. S. licensee for Zeiss machines). They have welded tungsten, most of the stainless steels, titanium, copper, aluminum, tantalum, zirconium, molybdenum, columbium, and vanadium.



NRC Equipment Corp.

**Electron beam welding was used to hold these titanium inserts in copper sleeves. Welding dissimilar metals is one of the method's strong points**



NRC Equipment Corp. Olin Mathieson Chemical Corp.

**At left, a photomicrograph of a "continuous spike weld" in 347 stainless steel—a weld in which sound joints are made when corners are not accessible. At right, a buttweld in 2½ in. thick, stainless steel plates. Welded at 145,000 volts and 12 milliamperes at a rate of 15 in. a minute, the photo illustrates the exceptional ratio of depth to fusion zone width possible with high voltage electron beam welding**

Although some alloys are more troublesome than others (75S aluminum isn't under control yet, although 2S, 24S, and 61S are), the engineers feel success awaits only enough experimentation to learn precise machine operating conditions and settings.

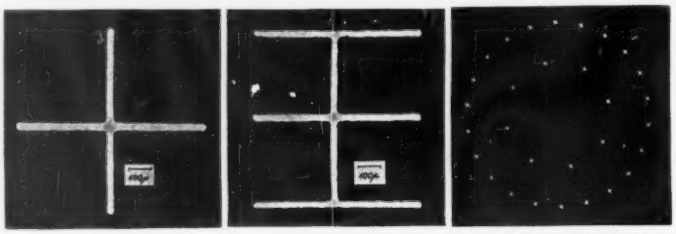
be closely controlled, and the diameter of the impact area can be focused precisely (to less than 0.001, in some cases). The beam can be pulsed to produce short intervals of instantaneous high power. There is no sustaining heat to affect adjacent areas.

● **The severest limitation, the vacuum chamber, will continue to hamper some work, but the size problem is already alleviated.**

Nearly all electron beam vacuum chambers have been large enough only to permit research work on small samples. With the advent of production jobs, larger vacuum chambers are in the works. One, for example, will be built for high voltage welding parts of nuclear fuel elements. The chamber will be 25 ft long, with an inside diameter of 44 in. The machine will have remote control and closed circuit TV.

Another problem: T. H. Crane, manager, product development, High Vacuum Equipment Corp., Hingham, Mass., says that since you

## MACHINING



Hamilton Electronic Inc.

**These are examples of the holes drilled through metal discs to form spinnerette extrusion dies for synthetic fabrics. The beam travel is electronically programed to trace the desired pattern. As shown by the scales, slot widths can be less than 100 microns (0.1 millimeter). The slots are traced by running the electron beam around the periphery, letting the metal in the center fall out. The photo at right shows a finished spinnerette with 30 die orifices**

DRILLING and milling are the newest applications. The two strong points: 1. The technique will machine any material—has been used to put holes in glass, diamonds, and nearly the full metal range. 2. It will drill holes less than 0.0008 in. in diameter. A limitation: Cut depths are usually less than 2 mm.

Using an extra set of electromagnetic focusing lenses, the Hamilton-Standard "milling machine" can get the beam spot down to about 0.0008 in. in diameter. The machine uses less current (100 microamperes instead of about 20 milliamperes maximum) than the welding machines, but with the smaller spot, it is capable of delivering more energy per unit area. Instead of melting the material, as in welding, the milling machine vaporizes the work in the area of beam contact. Temperature rise adjacent to the work area is kept down by pulsing the beam at 1 to 3000 cycles a second.

First market for the machine was in drilled jewel bearings (in production more than a year in West Germany). Now an excellent market is the manufacture of spinnerettes—extrusion dies for the synthetic threads such as nylon. Another big market is expected in the electronics industry, particularly with the further trend toward component miniaturization.

must work within the closed chamber, "the introduction of motion other than straight line or rotation is difficult." Thus, in welding, for example, it might be difficult (but not impossible, the experts remind) to trace a contoured weld path.

Finally, it can sometimes be difficult to control the composition of melted samples, since some alloying elements may be outgassed just as the impurities are.

**• Electron beam melting has become a commercial process for refining metals, particularly the reactive and refractory types.**

At Wah Chang Corp.'s Albany, Oreg., plant, for example, three electron beam furnaces, made by Stauffer-Temescal Co., Richmond, Calif., are casting ingots up to 6 in. in diameter. The large producer of refractory metals (STEEL, Aug. 8, p. 58) sells electron beam refined hafnium, columbium, tungsten, tantalum, zirconium, and molybdenum. K. C. Li Jr., vice president of operation and sales, says that the process will outproduce conventional resistance refining by 20 to 100 times, resulting in a higher degree of purity at a substantial cost saving.

Several other companies (including Stauffer-Temescal) are doing commercial refining, and a host of researchers are doing it in the laboratory. Walter R. Witzke, Lewis Research Center, National Aeronautics & Space Administration, Cleveland, says: "We use electron beam melting to prepare ultrapure tungsten to determine its mechanical properties. We're using the floating zone method . . . contamination from melt containers is not encountered. In addition to purification, zone melting converts the tungsten rod to a single crystal . . . it has considerable ductility at room temperature, where commercial tungsten rod exhibits none." (See photo on Page 127.)

Scientists at Battelle Memorial Institute, Columbus, Ohio, are also using floating zone melting to provide samples for study. They report they find it especially valuable when it's necessary to attain extreme temperatures (6300° F), but that it has little special value for lower melting point metals (below about 1830° F).

Reactive Metals Inc., Ashtabula, Ohio, has done extensive work with electron beam melted cast ingots. The company has an Air Force contract to study the effect of electron beam melting on tantalum carbide, titanium carbide, zirconium diboride, tungsten, hafnium, beryllium, boron, boron-carbon, and boron-silicon alloys. The company names these advantages of the process: Ability to melt high melting point materials; avoidance of contamination, even from the crucible which is kept cold; close control of melting rate; ability to melt finely divided powders after compaction or after conversion to sintered bar.

One step beyond melting is the vaporization of materials. Robert Bakish, director of research, Alloyd Corp., Cambridge, Mass., reports that his company has vaporized (and then deposited the vapor in the form of microthin films on work surfaces) tungsten, tantalum, columbium, silicon and aluminum oxides, and pure silicon. The electronics industry is a broad market for the thin film deposits for semiconductor components.

**• "U. S. industry now represents a market for more than $100 million worth of electron beam welding equipment."**

That's the consensus of several

of the leading makers of electron beam welding equipment. One, Robert P. Irwin, Hamilton Electrona Inc., New York, elaborates: "The process is now sophisticated enough to satisfy that kind of market. To exploit it fully, we must attain a higher output of equipment, we must help educate the user on the process and help him solve application problems, and we await greater availability of pure refractory metals for some of the jobs to be done."

Nearly all the electron beam welding equipment in this country is being used for research, either by equipment makers or by companies that feel the process has a potential for them.

Now, however, the breakthrough to production is starting. North American Aviation Inc. may soon put the process to work. One example of an aircraft job: Sections of full hard, Armco 17-7 PH steel skins were butted; a gap of 1¼ in. separated the top skin from the bottom. By carefully aligning the joints in the upper and lower skin, engineers electron beam welded both joints in a single pass on a Hamilton-Standard, high voltage machine.

Contrary to some reports, electron beam welding can be done with filler metal. Controllability of the beam permits welding on foil-thick materials. Further, the technique is a natural for welding vacuum vessels—evacuation of the vessel comes "free."

One of the machines made by Sciaky Bros. Inc. (STEEL, May 23, p. 150) has a completely automatic dial feed system for production welding end caps to tubular parts.

**• Machining, the newcomer, is for special work. You can use it, for example, to drill or slot smaller holes and grooves than you can handle with conventional methods. Or you may need it to work on materials that can't be machined any other way.**

Only four production applications of electron beam machining are reported in this country, but the experts feel that the technique has a great (though unmeasured) future. Two makers of synthetic fabrics, an electronic equipment maker, and a job shop are using the technique.

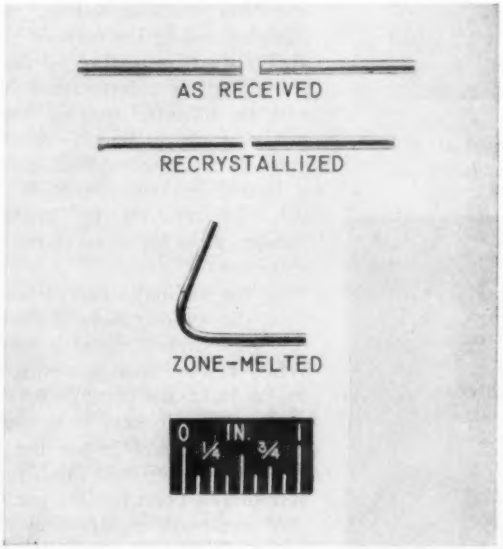
Synthetic fibermakers use the method to make the extrusion dies for threads (see Page 126). The electronics company is using it to make micromodular circuit elements. The job shop is L. R. Industries Inc., Mt. Vernon, N. Y.

The process can use a beam that's focused to 0.0008 in., and it can drill (under optimum conditions) a hole only 0.0004 in. in diameter. (The hole can be smaller than the beam since only the hot, center portion of the beam can be allowed to do the work.)

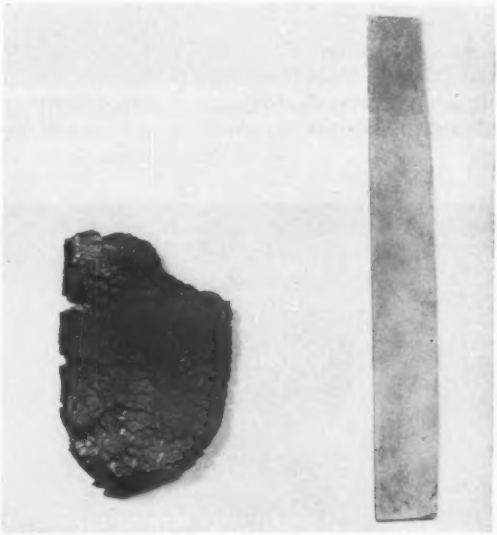
A limitation for the process: The deepest hole or slot that can be machined is about 0.08 in. Beyond that, the walls absorb the beam energy.

## MELTING

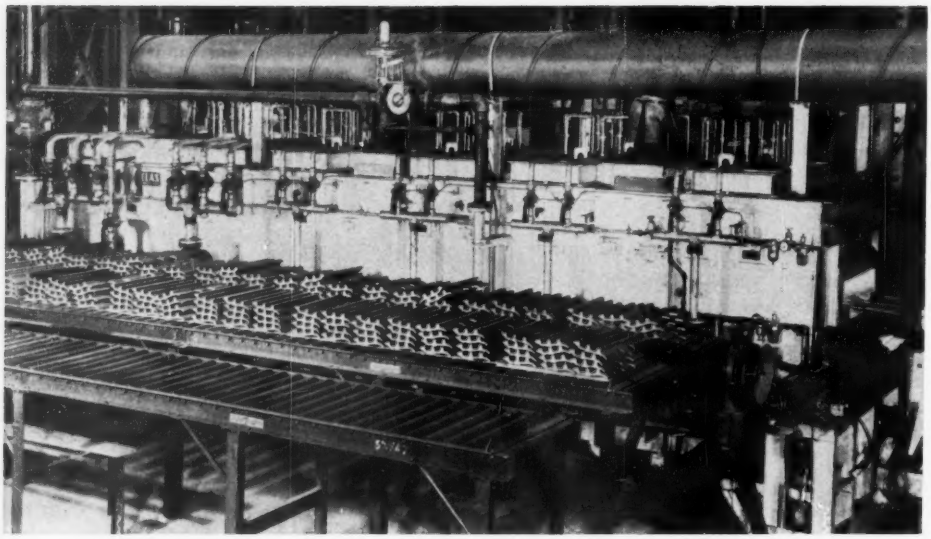
THESE two photographs dramatize the importance of electron beam melting to high purity metals. At left, room temperature bend ductility tests on tungsten rod. In both the as-received and the recrystallized commercial samples, tungsten showed no ductility. In the electron beam, zone melted sample, however, ductility was excellent. In the photograph at right, two samples of cobalt rolled at 1800° F. The sample at left had been arc melted. The other was rolled from electron beam melted metal.




Lewis Research Center, NASA



Reactive Metals Inc.



This walking beam furnace heats track shoes for crawler type tractors. The furnace is integrated into a production line

# Conveyorized, Radiant Furnace Heats 6000 lb an Hour

**A WALKING BEAM furnace is heating track shoes for punching and forming at a rate of 6000 lb an hour. The specified hardness pattern and a high degree of uniformity are maintained.**

The furnace is installed at the Melrose Park (Ill.) Works, International Harvester Co.

Engineers at Selas Corp. of America, Dresher, Pa., were faced with three problems in designing and building the furnace, says R. E. Buckholdt, manager of Selas' Furnace & Kiln Div. 1. The furnace had to be compact, and it had to be integrated into a production line. 2. Precise control of temperature was a must. 3. Heating had to be uniform throughout the irregularly shaped workpiece.

**• Automatic transfer takes parts through the shear, furnace, press, and quench.**

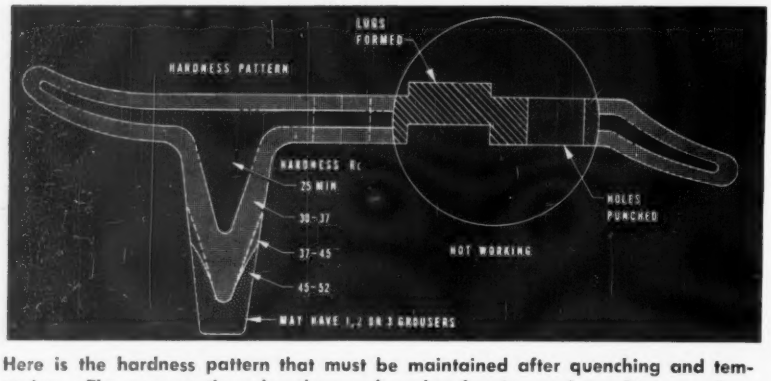
Bars are first sheared to length, notched, and fed onto a conveyor. A turning device in the conveyor line carries track shoes either to the clipping press and storage racks or (if clipping is not required) directly to the hardening furnace.

The track shoes then travel to a magazine loading station at the charging end of the furnace. They are pushed into the furnace by pneumatic actuators synchronized with the furnace's walking beam.

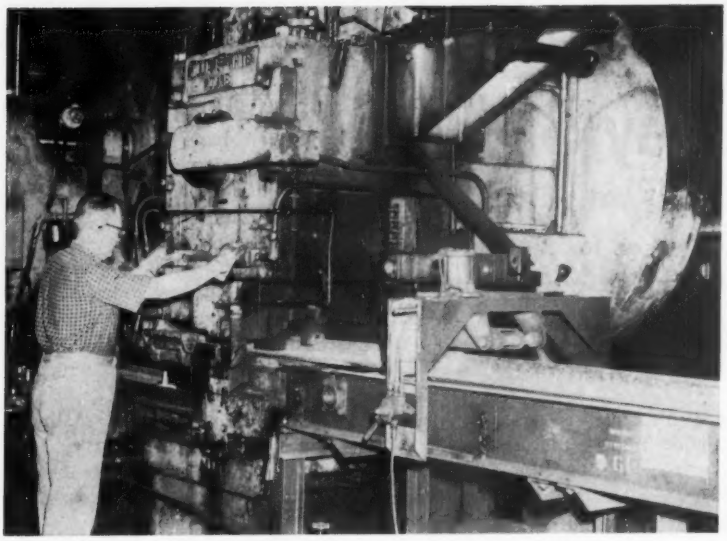
The furnace length accommodates 24 track shoes, each of which is heated uniformly to 1650° F in only 14 minutes by Duradiant burners mounted close to the work surfaces.

At the discharge end of the furnace, the walking beam extends between movable forks of a carriage. When a track shoe is resting fully on the forks, the carriage is retracted from the furnace to a flip-over table where a bar wipes the track shoe from the forks and flips it over onto a press loading conveyor.

A pneumatic pusher arm moves the work toward the press, holds it against a stop for the punching and forming operation, then moves




Here is the hardness pattern that must be maintained after quenching and tempering. The cross section also shows where hot forming and punching are done



A roller conveyor moves the bar into a shear, where it's cut to length

After the tracks are sheared, the operator loads them on the furnace charge table for their 14 minute heating cycle

it into a press fixture for immediate quenching in water.

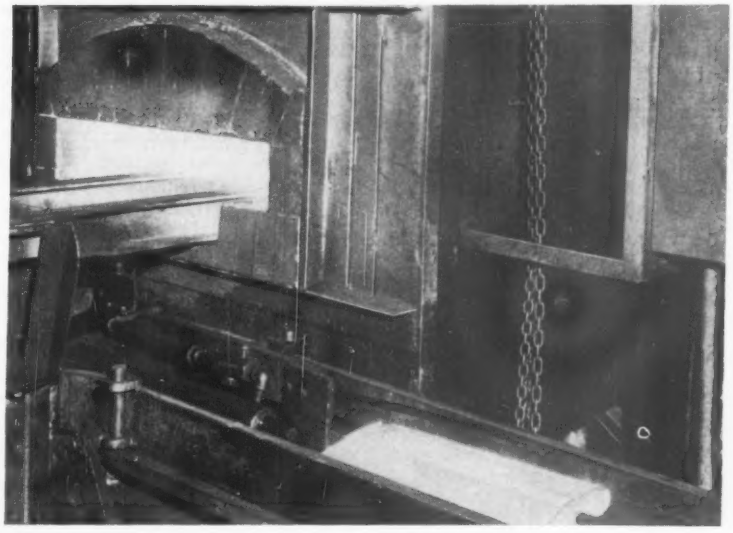
A heated piece is transferred from the furnace, punched, and quenched every 34 seconds. The production line, including the 6 ft wide by 28 ft long furnace, occupies only 40 by 130 ft, and it produces over 2000 shoes a day.

**• The hardness pattern must provide wear resistance and toughness.**

A closely controlled hardness pattern calls for the development of uniform temperature in the irregular cross section of the shoe. Water quenching must develop a high surface hardness tapering off to a lower core hardness. The pattern is established by the hardenability characteristics of the steel.

Subsequent tempering of the hardened track shoe maintains a hardness of 45 to 52 Rockwell C on the surface at the top of the grouser, but lowers the surface hardness down to 37 to 45 Rc and 30 to 37 Rc in the next two sections nearer the backplate. Core hardness is maintained at 25 Rc throughout. The pattern provides the necessary wear resistance in the grouser and the required toughness in the remainder of the track shoe for longest possible service life.

**• The unusually short (14 minute) exposure to the heat, combined with accurate control of the gas-air fuel ratio, virtually eliminates any scale formation on the track shoes.**



A hot, three grouser, track shoe has emerged from the furnace and flipped over onto the press loading conveyor. It is being moved (lower right) to the punch press by an air actuated ram

This aids in lengthening the life of forming and punching dies and eases the job of cleaning the shoes.

Burners can be located close to the work surfaces because there is no flame impingement; combustion of the accurately proportioned gas-air mixture is completed entirely within each burner cup.

The heart of the combustion system is the Selas Combustion Controller. It consists of an adjustable port mixing valve and a motor driven compressor. The mixing valve provides the proper mixture of the gas over the entire range of capacity; the compressor provides needed capacity at constant pressure.

At the Melrose Park Works, the controller takes commercial 1000 Btu natural gas from the low pressure plant line, draws air from the room, mixes the two in the right ratio, and compresses the mixture to several pounds pressure for delivery to the burners. It maintains an accurate mixture at the desired ratio, regardless of variations in fuel demand.

# Claims Proved, Say Builders

**Exposition gives prospects chance to see for themselves that new machines are capable of increasing productivity, they assert. A couple of them document their cases**

MACHINE TOOL builders are convinced that improvements on machines being exhibited at The Machine Tool Exposition—1960 in Chicago are more extensive and in many cases provide higher production rates than those they had to offer five years ago.

An example is cited by Ralph Lagerfeldt, executive vice president, Colonial Broach & Machine Co., Detroit: "Today's broaching equipment will produce parts to about half the tolerances accepted in 1955. Where thousandths of an inch used to be customary tolerances, fractions of thousandths are now common. This has broadened the use of broaching equipment for finishing parts. At the same time, major improvements provide finer surface finishes.

"Despite these improvements, many machines, particularly those for surface broaching, cost no more than they did five years ago."

• **Tool Credit**—Mr. Lagerfeldt says the radical improvement in broach materials has resulted in increased broach life, making the broaching machine a natural partner for complete automation. A transfer machine installed last year, for example, is turning out four sizes of adjustable wrenches at a rate of 500 an hour.

New broach materials he cites include the M-2 and M-3 grades of high speed steel, and the high alloy, tungsten base, tool steels containing high percentages of vanadium, molybdenum, and cobalt.

Mr. Lagerfeldt says you can get more out of broaching than before also because broach grinding machines handle accuracies of 0.0001 in. and lengths up to 6 ft (2 ft was customary).

"With the improvements in broach grinding, and also the development of no-backlash index fixtures, more complex contours can be produced by broaching than ever before."

## Pressmakers Too

Last week, nearly every visitor at the machine tool show found press builders talking about cycle times a fraction of those most users have been working with.

As an example, Minster Machine Co. is showing straight side presses that already have a record of success like that at the Magnavox Co. plant in Paducah, Ky., where one new unit is doing the work of seven old ones.

The new press at Magnavox (see photo) is a 300 ton, two point, straight side press equipped with an automatic feed and progressive dies.

It is expected to pay for itself in 20 months with a 50 per cent reduction in part costs because:

1. One operator has replaced seven.

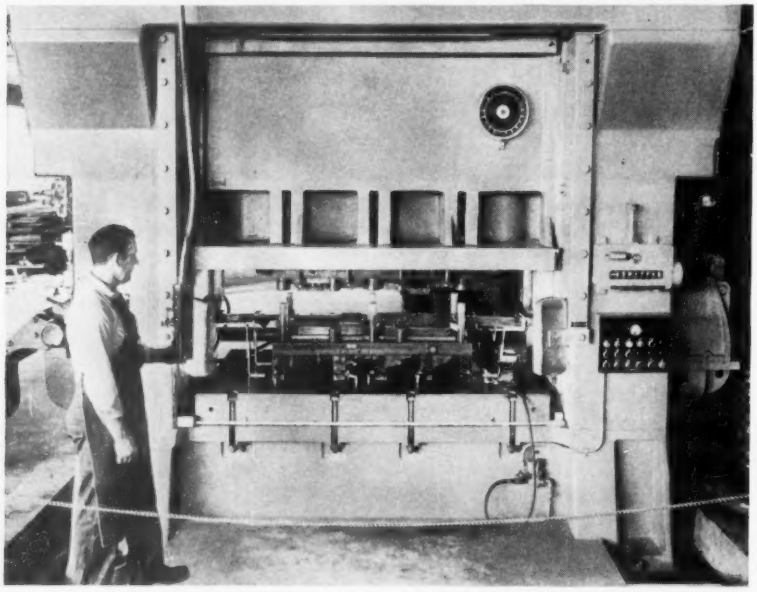
2. From 20 to 30 per cent less material is used.

3. Die maintenance has been reduced 90 per cent.

4. Die setup time has been cut 75 per cent.

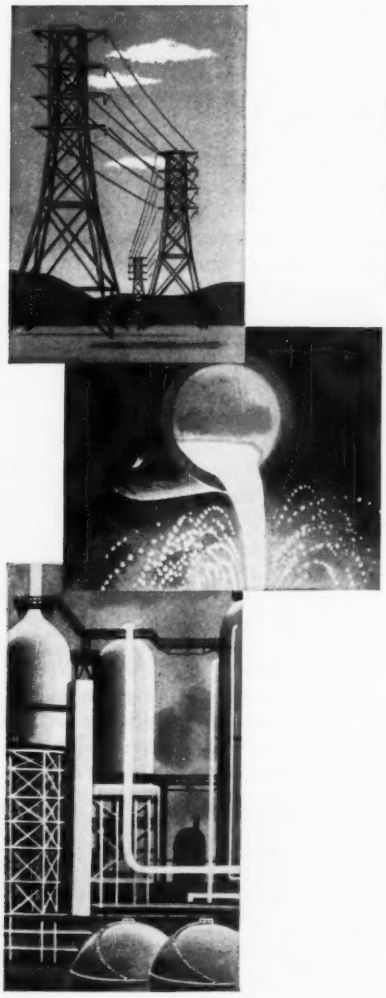
In addition, Magnavox officials say new parts are more accurate than the old ones.

Seven operators used to hand feed the parts which were then moved by chute and belt conveyor from press to press. Production averaged 625 parts an hour. Now, the cone housings are produced from coil stock. It moves through the progressive dies and parts come off the press at an average rate of 1800 an hour.



**Coil stock is fed from the left, finished parts go out the other side of this 300 ton Minster press at the Paducah, Ky., plant of Magnavox Co. The press turns out an average of 1800 loudspeaker cone housings an hour. Progressive dies (five to seven stages) are used**

*RCA-110 Industrial Control Computer*
*RCA-130 Industrial Data Transmission Link*
*RCA-150 Industrial Data Analyzer and Recorder*



# from RCA...

## 3 NEW Electronic Systems that Advance Industrial Automation

... with capabilities that range from simple automatic monitoring and recording to complete real-time computer control of a complex "automated" operation over a wide geographical area.

Specifically designed for industrial applications and environment, the **RCA-110 Industrial Control Computer System** provides around-the-clock operating reliability, highest arithmetic speed and lowest cost installation. One megacycle, solid state circuits are conservatively operated. Optional sizes of random access core memories for working storage are combined with magnetic drums for bulk storage to provide greatest speed and desired memory size at reasonable cost. All options program-compatible with each. Easily expansible in field. Automatic priority program interrupt increases operating efficiency, permits continuous automatic self checking and enhances programming ease. Accepts binary or decimal data. 24 bit word length. One or two address. Seven index registers. Seventy-one instructions. Addition time, including access—56 microseconds. Strong, dust-tight, industrial housings are internally air conditioned. Slide-out chassis and built-in maintenance control panel permits fast front-of-cabinet maintenance.

**RCA-130 Industrial Data Transmission Link** removes the limitation of distance in an automatic monitoring or control system. Provides reliable on-line, real-time, telemetering, alarming and remote control signal transmission of analog or digital information via wire or radio, one-way or two-way. 100% parity check of digital information. 100% continuity check of communications circuit. Frequency shift tone keying. Frequency multiplexing or time sharing of channel as desired. Remote reports may be self-initiating or centrally sequenced. Low power requirements. Application engineered from standardized modules to completely fulfill specific requirements at minimum expense. Operates with RCA-110, RCA-150, or custom display and supervisory operating console.

High-speed, automatic monitoring and analysis of process and production status is provided by the **RCA-150 Industrial Data Analysis and Recording System**—plus computational capability for summarizing, averaging, totalizing and linearizing. Automatic alarms of process malfunctions. Accepts up to hundreds of inputs at a rate up to 1,000 points per second, with programmed or sequential scanning. Provides outputs for display panel, punched paper tape and typewriter, with provision for automatic standby. Display log format and speed to purchaser's specification. Internal, analog-to-digital conversion. All solid state circuitry, packaged for industrial environment, with optional internal air conditioning.

For special industrial control problems, **Custom Systems** can be supplied to fit your exact needs.

RCA Industrial Monitoring and Control Systems are available with Foxboro instrumentation.

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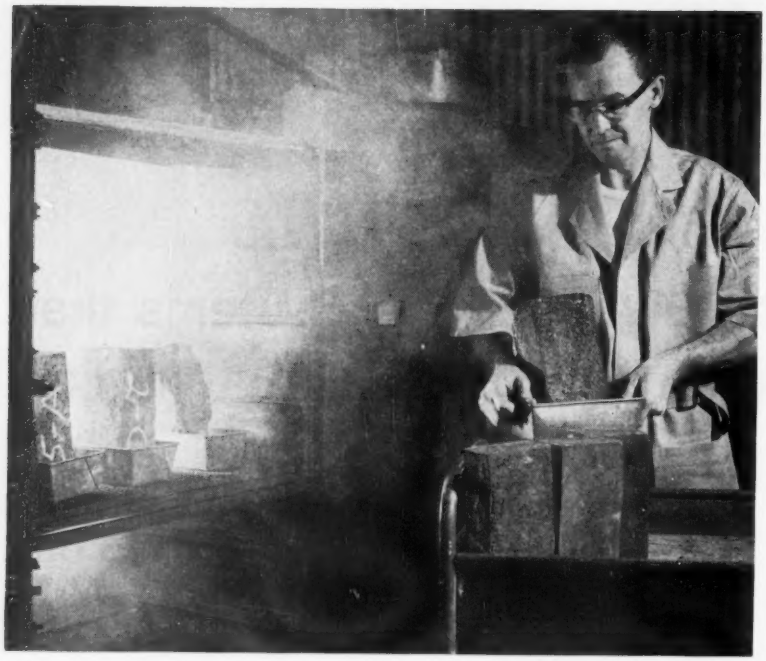


Ability of tar bonded refractories to resist hydration, which would cause slaking of lime and disintegration of the bricks, is tested in humidity ovens

# Tar Bonded Refractories Promise Longer Campaigns

They are said to give superior service in basic oxygen steelmaking furnaces; better manufacturing methods are said to allow longer storage in humid environments

**BETTER REFRACTORIES are needed to boost the output of basic oxygen steelmaking facilities and to reduce production costs. Each producer is determined to develop and manufacture the best possible lining materials to capture its share of the expanding L-D market.**

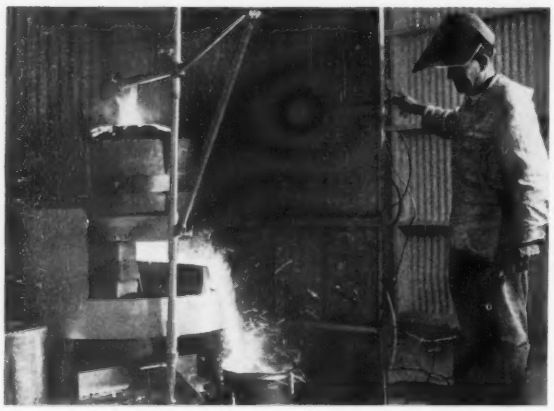
One of the producers, Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., Oakland, Calif., offers a new line of tar bonded bricks, said to last longer in storage and in the furnaces.

The refractories, a combination of dead burned dolomite and periclase, are made at the division's Moss Landing (Calif.) plant. Another plant, to be built adjacent to the firm's Columbiana (Ohio) facility, will use Eastern dolomite and periclase from the division's operation at Midland, Mich.

**• The bricks are said to resist deterioration in humid storage areas and give superior service.**

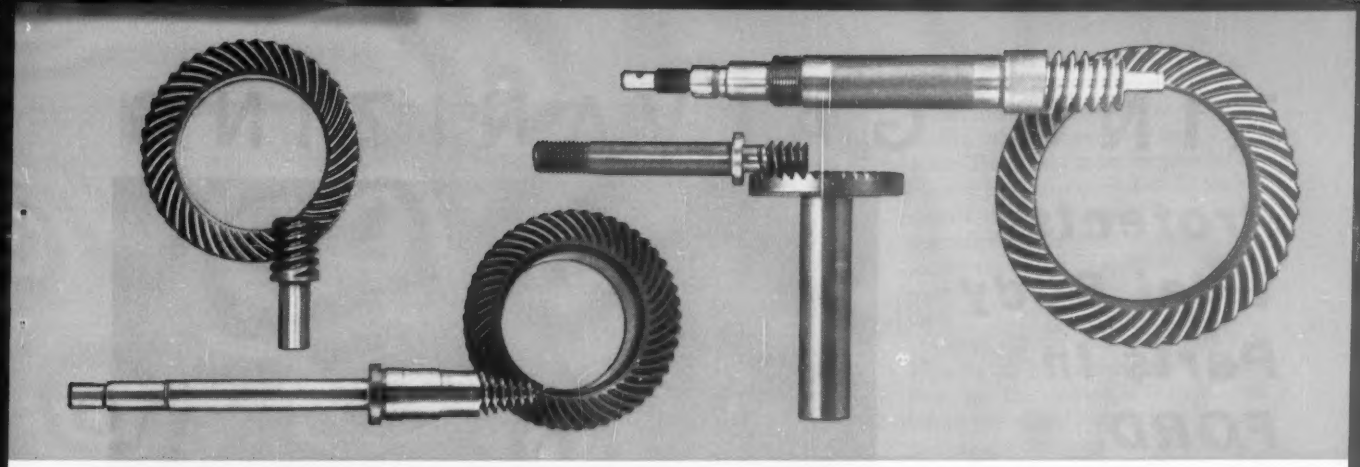
"We believe we have solved the problem of hydration, which has limited the use of tar bonded products," says James C. Hicks, the division's director of research. "That permits mass production at critical locations and makes it unnecessary to have smaller, less efficient facilities near customer locations."

Why the bricks resist hydration: A patented manufacturing method is said to protect the dolomite grain from moisture and permit more effective distribution of the tar. Moisture would cause lime in the dolomite to slake; subsequent swelling would break the grain and subject new surfaces to deterioration. The

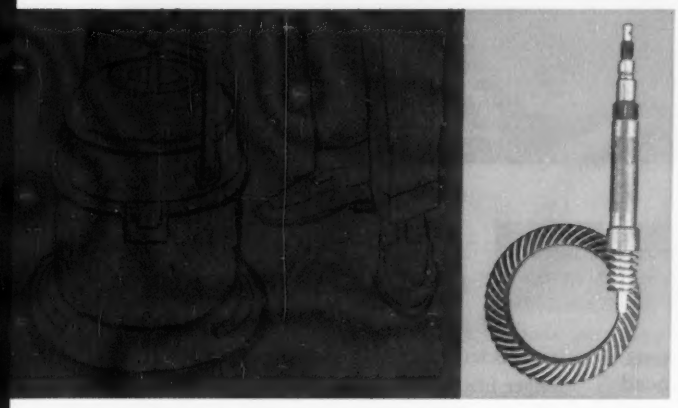


Experimental basic oxygen furnace at Kaiser's refractories research laboratory melts steel in 20 lb heats

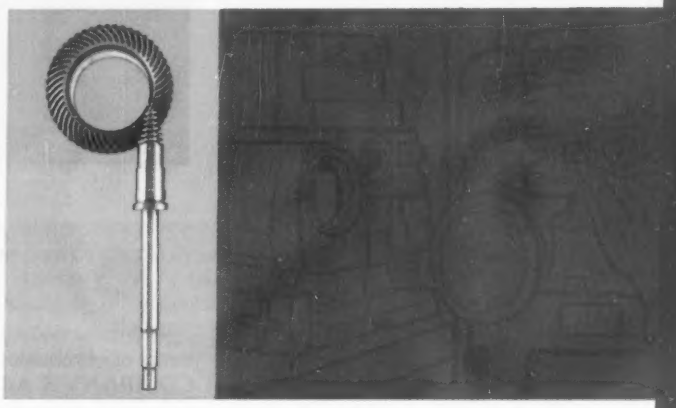
The miniature furnace is dismantled, and bricks are studied after eight heats have been melted



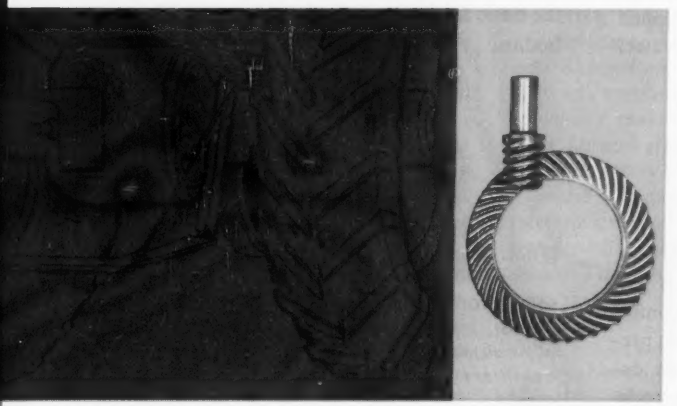
# WHICH OF THESE HIGH-RATIO HYPOIDS IS "**JUST RIGHT**" FOR YOUR PRODUCT?



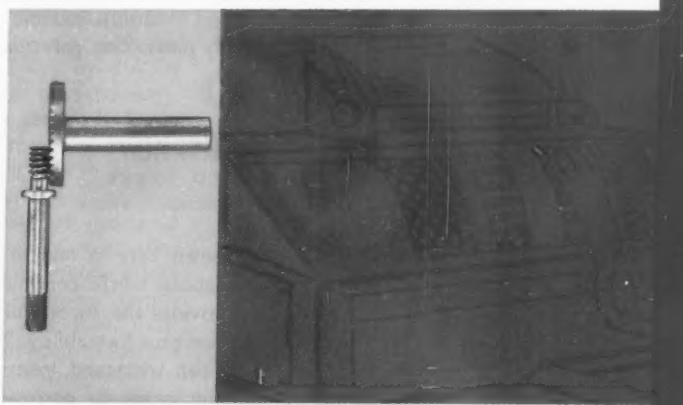
**For hand tools.** Where space is a problem—as in portable tools like this one—the high offset lets you design a more compact unit. Choose just the offset to solve your design problem with a more flexible, more compact unit than the corresponding worm and wheel.



**. . . or machine tools.** This high-offset pair lets you combine high reduction with strength, compactness and other advantages you might find profitable in designing machine tools. High-ratio hypoids can be produced on Gleason equipment for ratios of 1:10, 1:40 or even higher.



**Big and strong.** Where you need strength—as in farm machinery—high-offset hypoid pinions (with teeth which tend to "wrap around") are larger and stronger than corresponding bevel pinions. An extended shank on cylindrical pinions makes very rigid straddle mountings practical.



**. . . or small and smooth.** For smooth operation—as in office equipment that must run quietly—high-offset pairs provide smooth, quiet tooth action. Because teeth "wrap around" the pinion, you get continuous action—even with just one or two teeth! Grinders are available for applications requiring precision finish.

High-offset or high-ratio hypoids can be cut, tested, and quenched on the same Gleason equipment that is used on more familiar spiral bevel and hypoid gears. You can get more information about Gleason high-ratio hypoid gears by writing for free literature. Submit your prints for recommendations.

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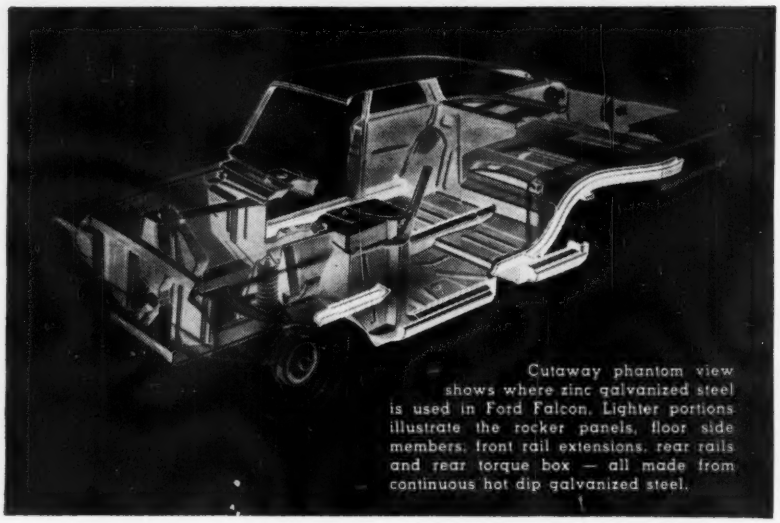
# ZINC GALVANIZING

## *Protects Vital Body Parts In FORD MOTOR CO.'s Compact Cars*



Cutaway phantom view shows where zinc galvanized steel is used in Ford Falcon. Lighter portions illustrate the rocker panels, floor side members, front rail extensions, rear rails and rear torque box — all made from continuous hot dip galvanized steel.

**COMPARATIVE TESTS PROVE GALVANIZED STEEL BEST CORROSION GUARD FOR VULNERABLE PARTS IN UNITIZED CONSTRUCTION**

After 2½ years of evaluation tests, FORD MOTOR COMPANY'S Advanced Body Development decided galvanized steel was the best material for protecting unitized bodies against corrosion.

The box type construction of unitized bodies makes corrosion a critical problem because moisture and road salts become trapped in vital underbody parts. Zinc galvanized steel is expected to give these parts 2½ to 3 times longer life than conventional low carbon steel. This would mean that they will be corrosion-free for 10 to 12 years under normal use.

This is the reason why Ford and other auto makers are now using galvanized steel for the basic framing members of the new unitized bodies.

**ANOTHER EXAMPLE OF THE VERSATILITY OF CONTINUOUS GALVANIZED STEEL**

The use shown here is one of a wide variety of applications where continuous galvanized sheet provides the successful combination of protection plus formability. This pre-protected metal can withstand torturous deformation without losing its corrosion-resistance. The zinc coat flows with the base metal — does not chip, flake, powder or peel under severe forming operations.

*St. Joseph Lead Co. supplies zinc "electronically-matched" to virtually any specifications which operators of continuous galvanizing lines may require.*

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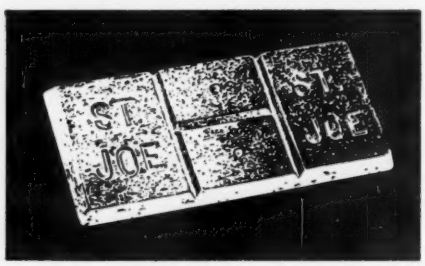


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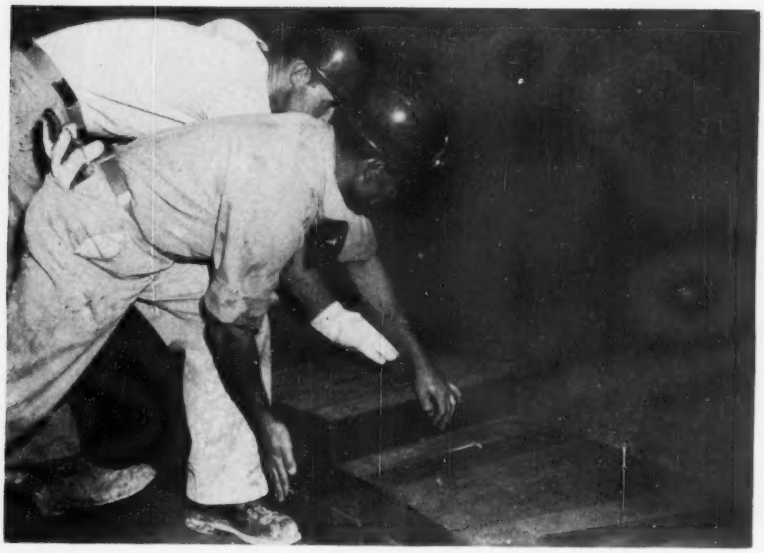


**Working lining of tar bonded bricks is laid in an oxygen vessel. Open space between the inner and outer lining is filled with rammed refractory material**

swelling and breaking are accelerating processes and could destroy bricks when only a small percentage of grains are hydrated.

One lining of the nonhydrating bricks, removed from its wrapped pallets after four months in storage, was installed without loss and turned in a campaign of 257 heats. Later, a tar bonded lining was used for 277 heats, with modest consumption of maintenance material.

**• A vibrating press was designed and used in making the bricks.**

The press is said to insure dimensional uniformity and density by putting grains in the best position for bonding. It also helps to prevent crushing of the grains.

Sized, dead burned dolomite and periclase are fed into rotary heaters, batch weighed, and mixed with heated coal tar and additives. After blending, the batches are taken to a vibrating press that can make bricks weighing up to 90 lb.

The bricks are formed, automatically discharged, and loaded on cooling racks. Later, they are palletized, packaged, and shipped.

**• Development work on the refractories included experimental heats in a laboratory furnace and field tests in commercial vessels.**

A continuous development program is carried on at the division's Milpitas (Calif.) laboratory.

Researchers began to study the basic oxygen steel process intensively as soon as it was commercially successful. Early studies: Process metallurgy and the effect of furnace environment on refractories. Satisfactory service was obtained from test panels and complete linings installed in Austrian furnaces.

During the development period, an experimental furnace, with inside dimensions of 4½ by 4½ by 13½ in., was built at the laboratory. It usually makes eight, 20 lb heats, with normal slag components, during a refractory test.

Several compositions and types of refractories were studied and field tested with varying success. Example: The dolomite-periclase bricks were installed at Dominion Foundries & Steel Ltd., Hamilton, Ont. Other bricks were shipped to Austria for evaluation. Petrographic observations following field tests correlated closely with laboratory results.

**• Some experts feel that ramming mixes, used between inner and outer lining in converters, may be eliminated.**

Current lining practice: Install a lining of burned periclase bricks against the outer wall, apply a dolomite - periclase ramming mix, then lay the working lining. Mr. Hicks indicates a trend toward elimination of the ramming mix. Reasons: The mixes must be plastic and cannot be compounded with the required carbon content; and bricks are more dense than ramming mix, so a more durable lining can be made without increasing vessel volume.

Depth of the working lining is 13½ to 22 in., depending on location in the vessel. The longest bricks are often installed in a wear pad on the charging side of the converter. In some installations, metal plates are placed between bricks in the cone of the vessel. The purpose: To help stabilize the lining during heatup.

The division's technicians recommend spiral construction in the lining, to hold down installation costs. Special attention must be given to the top of the cone section, to prevent loss of the upper courses. Tar bonded ramming mix is said to make a stable starting platform at the base of the converter wall.

Various materials are used for tapholes. In some operations, precast, chemically bonded, taphole blocks have been used successfully. In others, a ramming mix has been used. Moisture required for ramming apparently doesn't damage bricks containing dolomite.

High magnesia mixes have been used successfully in some furnace areas for repairs.

They have also been used for repiping tapholes.

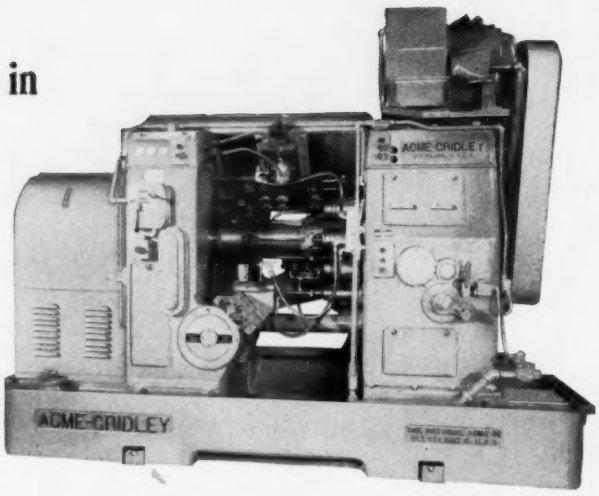
**• Improvements are expected in maintenance procedures and materials for oxygen vessels.**

"Significant increases in lining life would be possible with better maintenance at slag line corrosion points, repair of localized wear on the charging side of the converter, and repair of damage around the top of the vessel," says Mr. Hicks.

New linings must be heated up rapidly to coke the tar and form a carbon bond between grains in the refractories. And Mr. Hicks feels that heatup time can be reduced further.

The linings can probably be heated to 1800° F in 10 minutes and to operating temperature (2200° F) in a half hour. But Kaiser experts agree that vessel size or operating considerations might extend the heatup period.

## Major breakthrough in shaft production . . .




# Acme-Gridley multiple-spindle shaft machine equals output of four automated lathes

At Chrysler Corporation's Trenton, Michigan, Engine Plant, a remarkable new National Acme shaft turning machine has slashed camshaft production costs; is hailed as a major production development for the entire industry. Performing complete shaft journal machining in a single set-up, this rugged 6-spindle automatic provides substantial savings in floor space and capital outlay, reduces scrap loss and enables closer control of machining operations.

Key to this dramatic pay-off are imaginative National Acme solutions to the difficult problems of centering, driving, and stabilizing the long, flexible shaft during turning operations. An ingenious part-holding technique exposes bearing journals for turning—an impossibility in a chucking set-up.

Extreme capability is stressed in the design of the Universal Multiple-Spindle Shaft Turning Machine and permits the maximum number of machining operations to be performed on straight or flanged shafts held between centers.

The shaft turning machine is additional evidence of National Acme know-how applied to the solution of special machining problems. This same insight and ability is available to any manufacturer interested in reduced costs and increased production. Our representative is as close as your telephone.

**National Acme's "Zone of Responsibility" includes all phases of cost reduction. Check YOURS . . . Then Check National Acme**

**Direct Costs:** these include direct dollar savings as realized by Chrysler Corporation . . . an "everyday" job for Acme-Gridleys. **Indirect Costs:** effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc. **Product Redesign:** teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities. **Direct Material Costs:** our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems. **Make-or-Buy Reviews:** in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment. **Spot Modernization:** pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.

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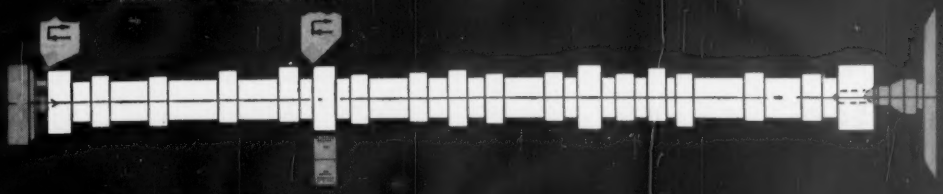
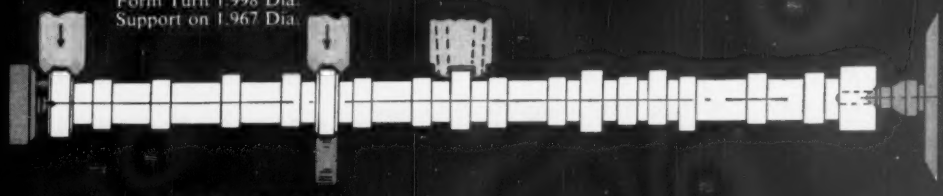


**2.** Form Turn 1.951 Dia.
Form Turn 1.967 Dia.

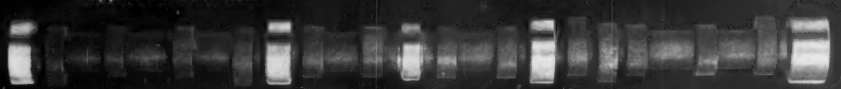
**3.** Form Turn 1.982 Dia.
Form Turn 1.998 Dia.
Support on 1.967 Dia.



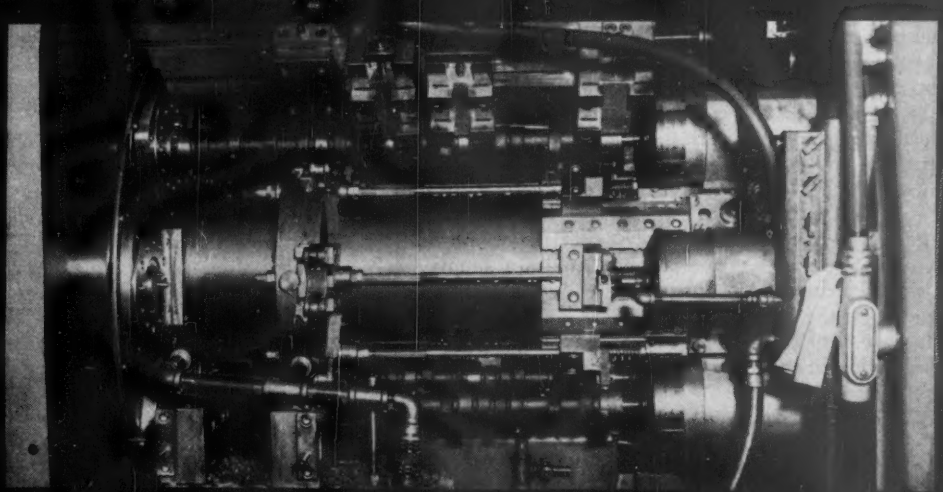
**4.** Chamfer O.D. of 1.951 Dia.
Chamfer O.D. of 1.967 Dia.
Face Sides of 1.743 Dia.
Support on 1.967 Dia.

**5.** Face End of Camshaft
Relieve Turn 1.743 Gear Dia.
Support on 1.967 Dia.

**6.** Chamfer O.D. of 1.743 Dia.
Chamfer O.D. of 1.982 Dia.
Chamfer O.D. of 1.998 Dia.
Support on 1.967 Dia.



High-test cast iron camshaft with journal machining completed . . . 13 operations in 22 seconds.



Close-up of tooling zone. Open spindle in load and unload position shows unique centering, holding and driving mechanism.

# Tin Plate Coil Shipments Promote Use of Computers

**Data accumulation systems accept signals from sensing devices and inspection stations on the processing line and provide a running record of imperfections**

**SHIPMENT of tin plate in coils instead of sheets doesn't permit producers to separate prime and secondary grades physically. But many users are asking for a detailed report or profile that indicates what flaws a coil contains and tells where they are.**

One system for finding the flaws, developed by Airborne Instruments Laboratory, Deer Park, N. Y., a division of Cutler-Hammer Inc., pinpoints the position of each flaw on tin plate traveling 1600 ft a minute. It uses existing sensing stations and automatically records data on printed tickets and punched paper tape.

**• The system collects information from several sensing devices and visual inspection stations along the processing line.**

Input devices used on the line at one steel mill include a photoelectric pinhole detector, and a beta ray gage to measure base metal thickness and provide signals indicating offgage material. Four x-ray gages determine plate thickness and indicate light or heavy plating on the top or bottom of the strip.

A footage meter provides an accurate measurement of strip length. Two visual inspection stations furnish signals indicating footage of defects in the material (such as color markings or unmelted coating). Welds are located on the record by the line operator, who presses a button as welds pass his station.

Switches on the operator's control panel permit coil identification data, such as the date, turn number, lot number, and coil number to be entered on the record.

A main computer unit accepts inputs from sensing units, calculates and combines information in the required form, then stores it until the coil is completed. Operation of the output shear initiates the printout of data on the coil in decimal form by two electric typewriters—one for the line operator and the other for the department superintendent.

**• High speed computer units handle 20 channels of information sequentially.**

The main computer section contains three identical units operating in parallel. Each computer contains an input section, an arithmetic section, a memory section, and an output buffer section. Computers contain plug-in, transistorized logic modules—flip-flops, "nor" units, drivers, and pulsers. Memory units are magnetostrictive delay lines.

Use of solid state devices, with no moving parts and low power consumption, makes blowers and air conditioners unnecessary.

Each computer includes 20 information channels, which accumulate data in 40 registers, in a buffer storage unit. Each register can handle 20 "bits" of information (binary code units).

**• Compensation is provided for differences in distance between sensing devices and a common reference point.**

Sensing devices are mounted at various points along the line. It is desirable to modify information from the devices so it seems to originate at the output shear. Delay time in the input section of each computer and the orbit time for each piece of information are selected to provide the right correction to each channel.

If one of the sensing devices is relocated, the right compensation can be obtained by a simple knob adjustment.

**• Three computers present the output data; if two agree, their information is accepted as accurate.**

A comparing circuit accepts outputs from the three computers. If all outputs are the same, the comparing circuit produces an output identical to its three inputs. If one of the computer outputs differs from the other two the comparing circuit output is determined from the two inputs that agree, and the system continues to operate. A trouble lamp indicates that one computer isn't operating properly.

While numbers in the storage section of each computer are being printed, the rest of the computer is free to accept data on the succeeding coil. That permits operation of printing equipment below its rated speed for greater reliability.

**• Equipment is designed for maximum reliability and low maintenance cost. Provision is made for operation on standby power.**

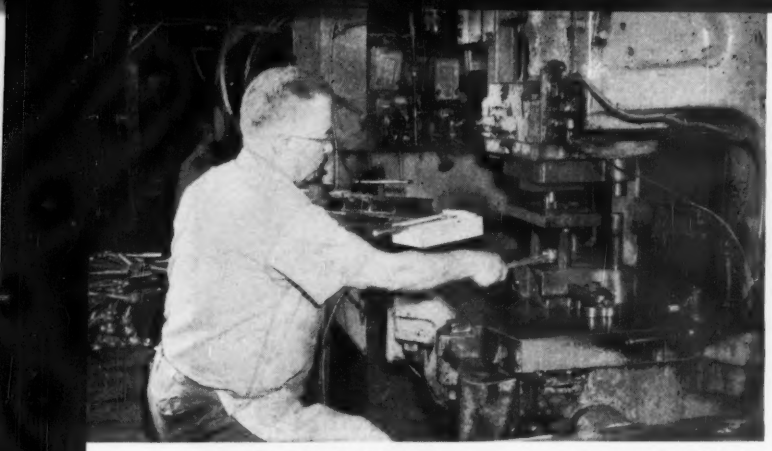
Electronic components are operated below their rated power, and the number of power consuming electronic circuits is small enough to permit complete enclosure without ventilation.

The system doesn't lose any of its stored information during power failures. It continues to operate during any power lapse that is less than 2 hours, drawing power from nickel-cadmium batteries. The change to standby power and back is automatic; and switching is done without moving parts. Recovery of the standby power source is sufficient to handle as many as two, 2 hour failures in any 24 hour period.

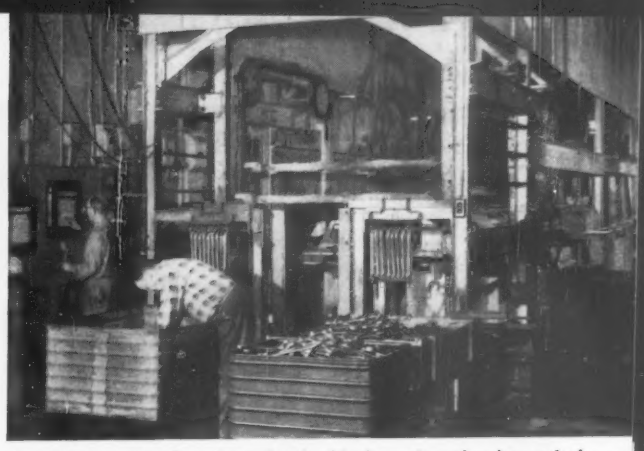
**• The system is said to be adjustable to other continuous processing applications.**

Products and important physical characteristics vary widely in various continuous processes, but Airborne officials predict increased application of data accumulation equipment in several areas. Examples: Quality control, production control, and pricing.

In the steel industry, more of the equipment is expected to show up on continuous annealing lines and on side trimming and coil preparation lines. Plating and cladding, coil preparation, and annealing lines are potential application areas in nonferrous metal industries. Rubber, plastics, and paper industries also offer potential markets.



Teeth in ratchet head and socket openings are induction heated for hot forming without tears or ruptures. Over-heating of steel is avoided and decarburization is prevented. Unusual accuracy is attained and the grain structure of the metal remains unbroken.



Completely machined ratchet and socket blanks are heated and quenched in a series of salt baths to develop the proper relationship of toughness and hardness without decarburization or dimensional distortion.

# A Push Button World at WILLIAMS

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41 teeth give 82 tooth action requiring less than 4½° swing of handle for complete nut rotation.
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The harder the pull on the handle, the more teeth that come in contact.
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Length directly proportioned to weight distribution for ideal balance, comfort and leverage.

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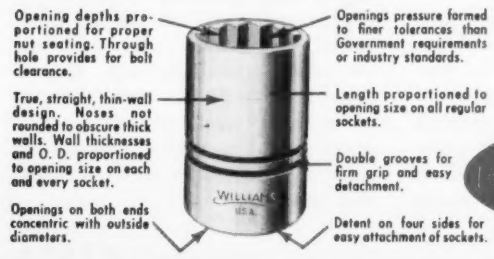
Rugged construction. No one part bears bulk of stress.
NEW... Single Unit Construction
Easily removed for cleaning, servicing and replacing
Stresses evenly distributed throughout entire mechanism.

**DETACHABLE SOCKET FEATURES**


Opening depths proportioned for proper nut seating. Through hole provides for bolt clearance.
True, straight, thin-wall design. Noses not rounded to obscure thick walls. Wall thicknesses and O. D. proportioned to opening size on each and every socket.
Openings on both ends concentric with outside diameters.
Openings pressure formed to finer tolerances than Government requirements or industry standards.
Length proportioned to opening size on all regular sockets.
Double grooves for firm grip and easy detachment.
Detent on four sides for easy attachment of sockets.
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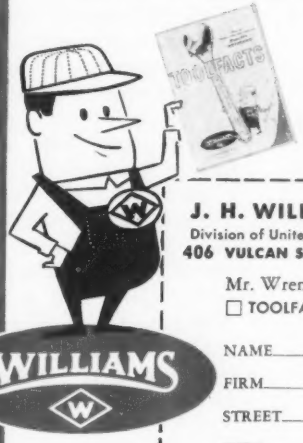


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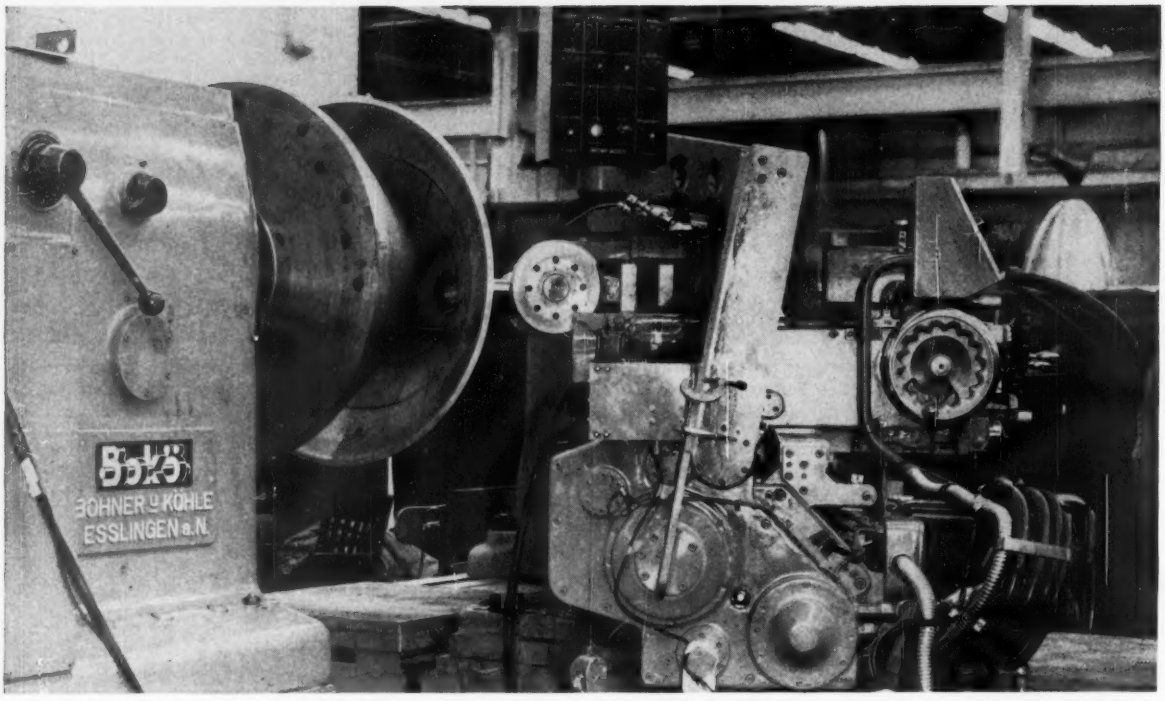



**Boko spinning lathe has first operation nose cone mounted for final forming. Machine can be operated manually or automatically**

# Two Step Method Turns Out Seamless Rocket Casings

**Joints have caused designers a lot of trouble. Aircraft engineering firm suggests one way around problem: Spinning a preform in an automatic spinning lathe**

PROCESSING high strength metals into long tubes for rocket cases poses two problems. Engineers say seams are a headache because the casings are stressed practically to their ultimate strength, and no joining system appears to be adequate for the job.

A possible solution, spinning a preform in an automatic spinning lathe, is offered by Grumman Aircraft Engineering Corp., Bethpage, N. Y.

The firm says it has had success in turning out small, experimental casings made of aluminum alloys, SAE 4130, stainless 321 and 301, H-11 tool steel, and titanium. It believes bigger machines can handle the larger rocket sizes.

**• Process starts with a flat disc which is first made into a preform for spinning.**

Grumman used 0.125 in. stock about 9 in. in diameter. A 400 ton hydraulic press made a 3½ in. preform in about half a minute.

The second step: Flow or chipless turning on a Boko spinning lathe (a West German machine) which also turns out missile nose cones and airplane parts like tail cones, venturis, tanks, reservoirs, and air scoops. The machine, which is practically automatic, flows the metal from the preform to a vase-like shape 19 in. long and perhaps 4 in. in diameter in less than 15 minutes. Most metals require no intermediate annealings, production people claim. Wall thickness is reduced perhaps 85 per cent without distortion.

Grumman officials say: "The combination of draw forming and spinning strengthens our position in the competitive field of monolithic, single unit rocket case construction."

**• The lathe is considered "quite versatile and of high capacity for its size."**

The Boko machine can be employed for hand controlled spinning, full tracer spinning, and flow forming or shear spinning. It has a 360 degree swivel on the roller compound which aids rapid setup for secondary operations, says Grumman. Built-in devices make it possible to choose semiautomatic or automatic operation with a uniform repeatability of roller position, feed, and pressure.

*in 1960...*

**LOOK TO**

# McKAY MACHINE

**FOR PROGRESS IN METAL PROCESSING**

**FOR EXAMPLE,** the revolutionary new McKaymatic* Die Shear Line that has reduced costs and cut scrap losses for many steel makers, warehousers, and fabricators. For the complete story on one of these — Eastern Stainless Steel Corporation—please turn the page.

McKAY
McKAY

# Revolutionary New McKaymatic* Die Shear Line boosts production ...cuts scrap loss for Eastern Stainless!

Photo by Arnold Newman shows (seated left to right) W. F. Schneid, vice president—general manager, and H. J. Verner, chief engineer of Eastern Stainless Steel Corp., discussing cost reductions in stainless steel processing with (standing) McKay Machine sales engineer, Robert D. Lynn, in front of a McKaymatic* Die Shear Line recently installed in Eastern Stainless' cold strip department

"We consider the McKaymatic* the finest advancement in shearing to come along in a great many years," says W.F. Schneid, vice president-general manager, of Eastern Stainless Steel Corporation, Baltimore, Md. "We have reduced production time, cut our scrap loss, and have recorded an overall increase in department efficiency as a direct result of this new McKay die shear line," Mr. Schneid continues.

Eastern Stainless is a prime supplier of stainless steel sheets, strip and plates, for aircraft and missile parts, for food, chemical, paper and textile machinery and for architectural uses. It produces 25 grades of stainless steel in its own modern electric furnace facilities, and ships about sixty-six percent of it in sheet form.

**Programs many grades instantly**—Through improved roller leveler techniques, Eastern Stainless found it was able to instantly program many grades of sheet through its new McKaymatic* Die Shear Line. The line decoils, levels in a 17-roll McKay Roller Leveler, measures by electronics and cuts to length—replacing a cut-up, re-level, and re-square operation prior to boxing. Production of cut lengths has been substantially increased.

The result, they report, is cost savings. Says Mr Schneid: "As a result of our efforts to improve customer service, we installed this line to speed up production of these cut lengths. It has enabled us to break a production bottleneck for which there seemed to be no solution."

**Line eliminates stretcher leveling**—Mr. Schneid continued that production time has been reduced on sheets of five grades as a result of being able to eliminate stretcher leveling and re-squaring procedures. Also, he said, the scrap loss on re-squaring has been eliminated as the sheets are cut clean and square on the McKay line. Net effect of the installation was a definite increase in overall departmental efficiency.

H. J. Verner, chief engineer, remarked that the McKay roller leveler could process these grades of stainless, within its capacity, to flatness approaching that obtained from the stretcher method. He reported that the Die Shear Line is being used to prepare for shipping cold rolled sheet from 4" to 48" in width, up to .050" in thickness, and in lengths from 36" and greater at normal production speeds. He particularly likes the McKaymatic* Die Shear Line for its ability to handle high finish stainless without edge or surface damage.

**Available in many sizes**—The McKaymatic* Die Shear Line is available in sizes to accommodate most commercial widths. Composed of decoiler (with coil car, if desired), roller leveler, measuring device, and cutoff press, it satisfies most requirements for sheet length accuracy and squareness, flatness, edge and surface quality protection and output rate.

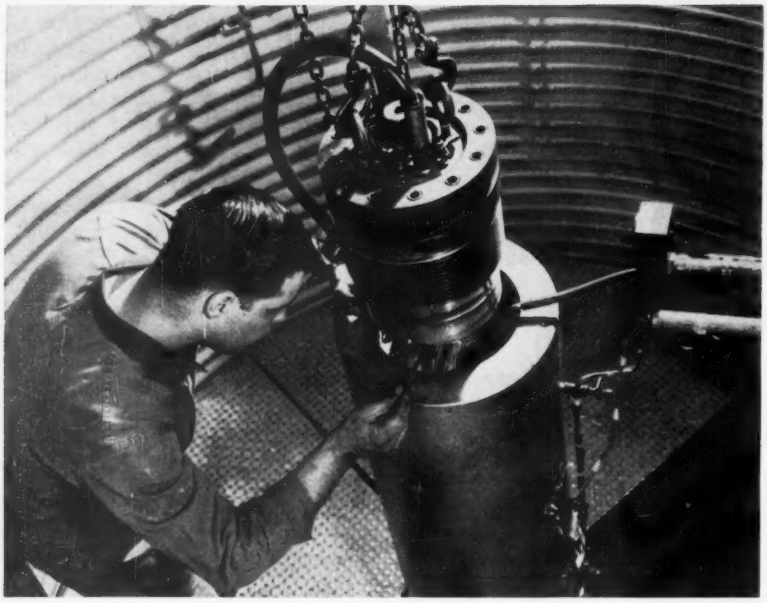
For short runs or long, the McKaymatic* Die Shear Line will better any other line in economy and efficiency. Whatever your cut-to-length problem, McKay Machine's engineers have a solution. Write for literature; send your specific needs for a quotation to *McKay Machine Company, Youngstown 1, Ohio.*

*TM

LOOK TO

McKAY MacK MACHINE

FOR PROGRESS IN METAL PROCESSING



High pressure reactor vessel (autoclave) at Battelle is similar to the production model at Westinghouse. Bonds are made at 10,000 psi at temperatures of 1500 to 2500° F

# Pressure Bonding Handles Dissimilar Metals

Combinations involving refractory metal cladding, powder compacting, and heat treatment can also be made by this method. Here's a current report on production application

**A COMBINATION of high pressure, heat, and time has beaten the problem of joining dissimilar metals.**

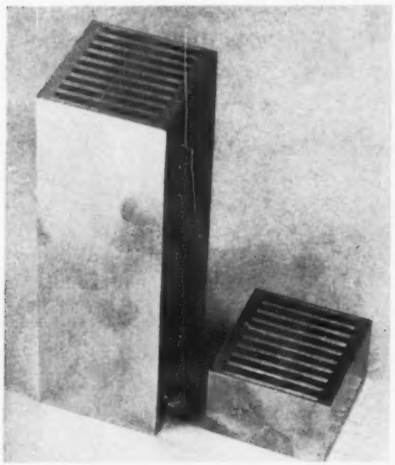
Called solid phase, high pressure, or gas diffusion bonding, the method can shave joining costs from two to four times in making clad fuel elements for atomic reactors from difficult refractory metals, claim metallurgists at Battelle Memorial Institute, Columbus, Ohio.

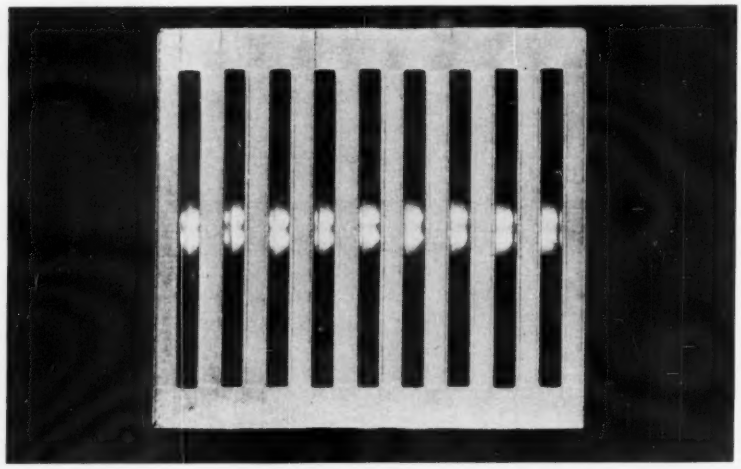
They also see these potentials via the new technique:

- Some aircraft, missile, or space vehicle parts made of hard, high melting metals will cost half as much as they do today.
- Base metals may be clad more economically with refractories or hard-to-handle coatings.
- Beryllium may make the transition to practical applications sooner than expected.
- Complex shapes can be produced easily; brittle metals can be clad; cermets can be compacted (densified) and clad in the same operation.

**• A combination of heat and pressure in a closed vessel causes a plastic flowing action between unlike metals. A following heat treatment practically removes any evidence of a joint.**

The first production installation is going in at Bettis Atomic Power Div., Westinghouse Electric Corp., Pittsburgh. The pressure vessel





Pressure bonded, flat plate assembly for reactor fuel cell is made of alternating layers of uranium cores and Zircaloy-2 cladding, with button spacers of Zircaloy. Hollow spaces for coolant passage are filled with carbon steel spacers during bonding, then chemically removed

(autoclave) is 21 in. in diameter by 14 ft long—big enough to handle several full-size fuel elements.

Nuclear reactors use powdered uranium dioxide ($UO_2$) for fuel. It must be protected from corrosion by a cladding—zirconium, for example.

Battelle makes up a complex sandwich of window-shaped pieces of uranium dioxide surrounded by zirconium spacers and side sheeting. The assembly is welded around the four edges to make an envelope. After it is evacuated, it is placed in an autoclave.

Good bonds are made in a helium atmosphere at pressures of 10,000 psi in less than 4 hours. Temperature ranges from 1500 to 2500° F, depending on metals being joined. A 5 minute postbonding heat treatment in a salt bath at 1850° F (for zirconium) may encourage grain growth across the bonded area which just about removes any evidence of a joint line.

**• Surface preparation is particularly important, says co-developer Edwin S. Hodge. Machining or grinding with an abrasive belt is necessary.**

Extensive tests show that even slight contamination of joint surfaces can greatly interfere with good bonding. Abrasive belt was more economical at Battelle than other methods. Chemical cleaners didn't work satisfactorily.

At the temperatures needed for bonding, claddings frequently react with the uranium dioxide, interfering with its efficiency as a fuel. A thin coating of chromium, graphite, or carbon over the uranium dioxide effectively prevents the diffusion. Graphite was the most economical, says Battelle.

**• What's Ahead?**—Battelle scientists feel the process can be immediately practical in preparing parts for defense equipment. Studies of beryllium are being pressed—with encouraging results.

Mr. Hodge points out that the process can simultaneously compact a powdered metal into a finished shape, clad it with another material, and heat treat to finished condition. Also, he believes that the method is practical for preparing tubes made of several layers of different metals.

# Tooling Problem Solved By Graphitic Die Steel

**SELECTION of the right die steel was an important consideration at the Hoover Co., North Canton, Ohio, when the firm was tooling up to make its newest home appliance—an electric floor washer.**

Forming components of thermosetting plastic and metal is a punishing job for tooling. The company decided to make most of the dies of Graph-Mo, an oil hardening, graphitic tool steel produced by Timken Roller Bearing Co., Canton, Ohio.

**• The steel machines easily, in spite of its reputation for high abrasion resistance.**

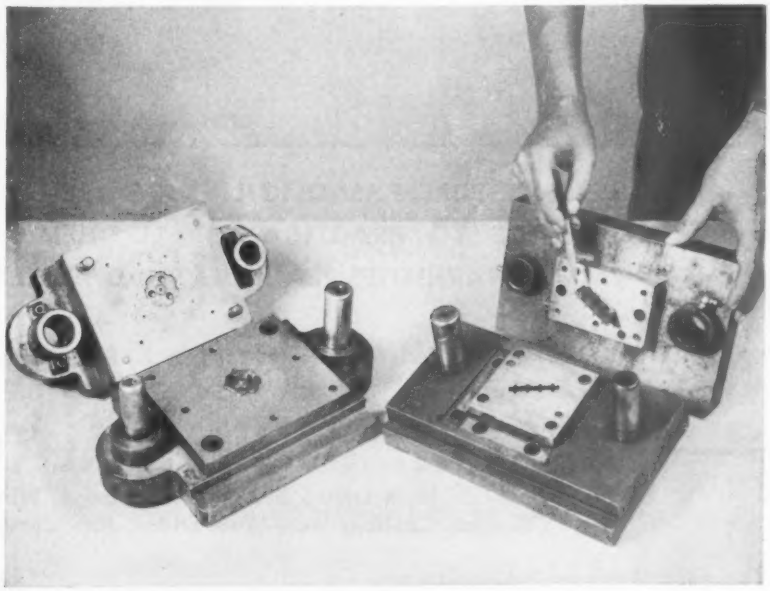
Diemakers at Hoover find that graphitic carbon in the steel gives it better machinability.

"The wear resistance required of a die steel in forming and drawing operations is inherent in Graph-Mo because of its graphitic structure," says John Risher, tool and die design engineer at Hoover. "We have seen less galling of dies and lower tooling maintenance cost."

The company first used the steel for blanking dies and for form and draw dies. Later, use of the steel was extended to components of casting dies and molds—slides, locks, or other parts that must have good wear resistance but don't form part of the cavity.

**• Experts attribute wear resistance to graphite and carbide particles in the microstructure.**

Metallurgists at Timken believe the small graphite particles inhibit initial scuffing by serving as reservoirs for externally applied lubricant. Hard peaks of carbide, between the graphite pockets, act as bearing points, reducing friction. And the chemical combination of high carbon and high silicon is said to make the steel extremely hard and tough.



**Most parts for the floor washer are formed in dies made of oil hardening, graphitic tool steel because of its wear resistance and free machining qualities**

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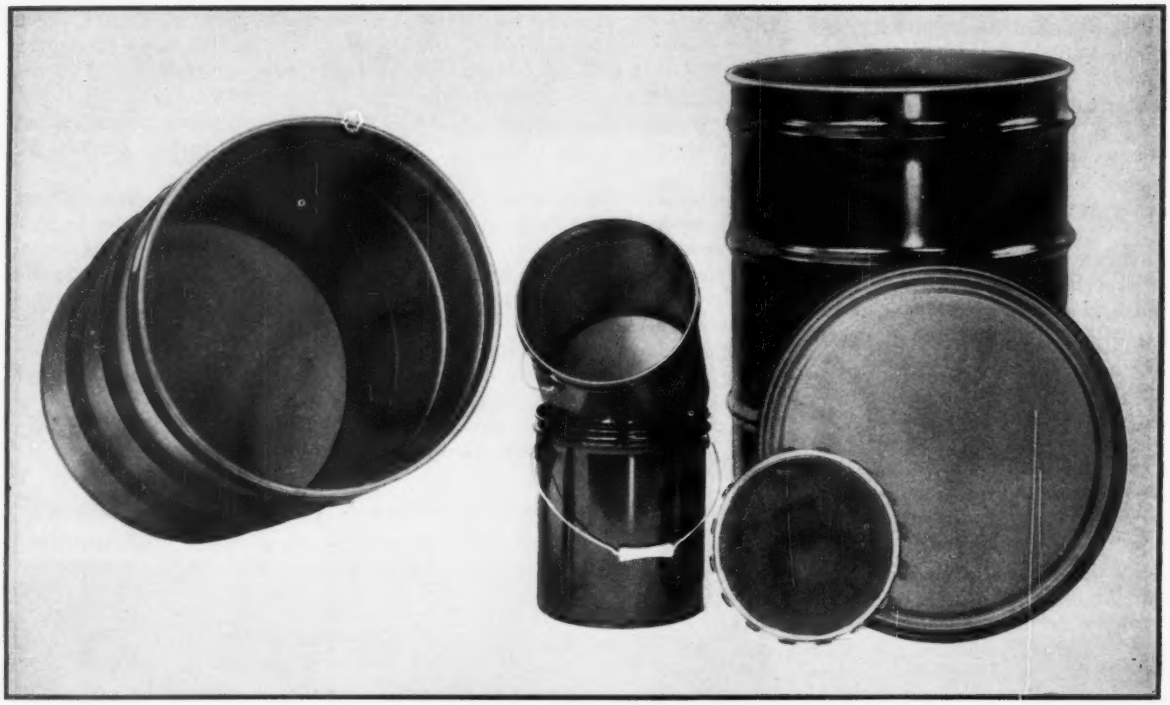

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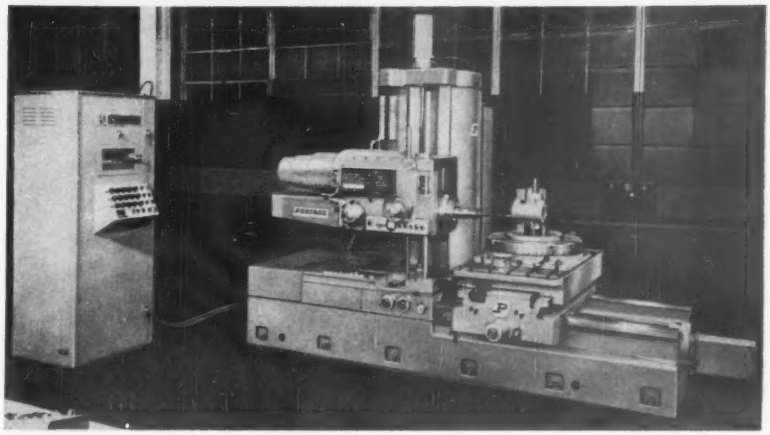
# Horizontal Milling Unit Comes with Tape Control

THIS horizontal milling, drilling, and boring machine is available with a 3⅜ in. spindle. Tape control and position measuring are included in a Warner & Swasey Tele-Probomat unit. A Friden Flexowriter or a Warner & Swasey key punch can be used to prepare binary code, numerical data on a standard, 1 in., eight channel tape.

The tape reader can be used with the key punch to duplicate tapes. Readout units on each axis position to 0.001 in. with repeatability to 0.0005 in. The standard tape system (three axis) controls the head, table, and saddle movements. Input for numerical positioning information can be dialed or taped. Zero set is included for initial part positioning and recheck can be made at any time.



A number readout in the tape console is coded to the part planning. It tells the operator what tools to use and any other information required to complete the job. With the tape console switched out, the machine can be operated from its general purpose control stations.

The unit is displayed at The Machine Tool Exposition—1960, Booth 338.

For further information, *write* Portage Machine Co., 1033 Sweitzer Ave., Akron 11, Ohio.

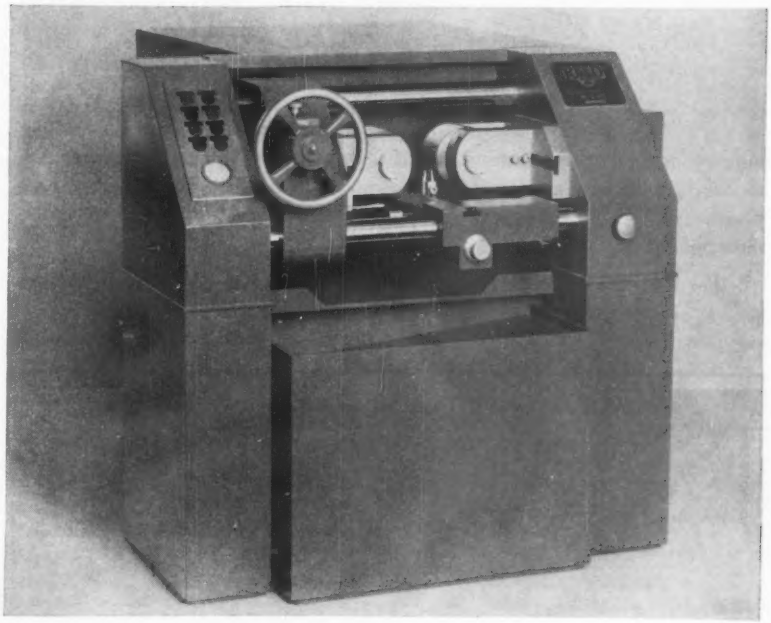
# Cylindrical Die Machine Is High Production Type

A GENERAL purpose threading machine (Model B910) has production rates above 200 pieces a minute in a size range from ⅜ to 1 in. It has two cylindrical dies. Production rates vary with size, length of thread, and hardness of material.

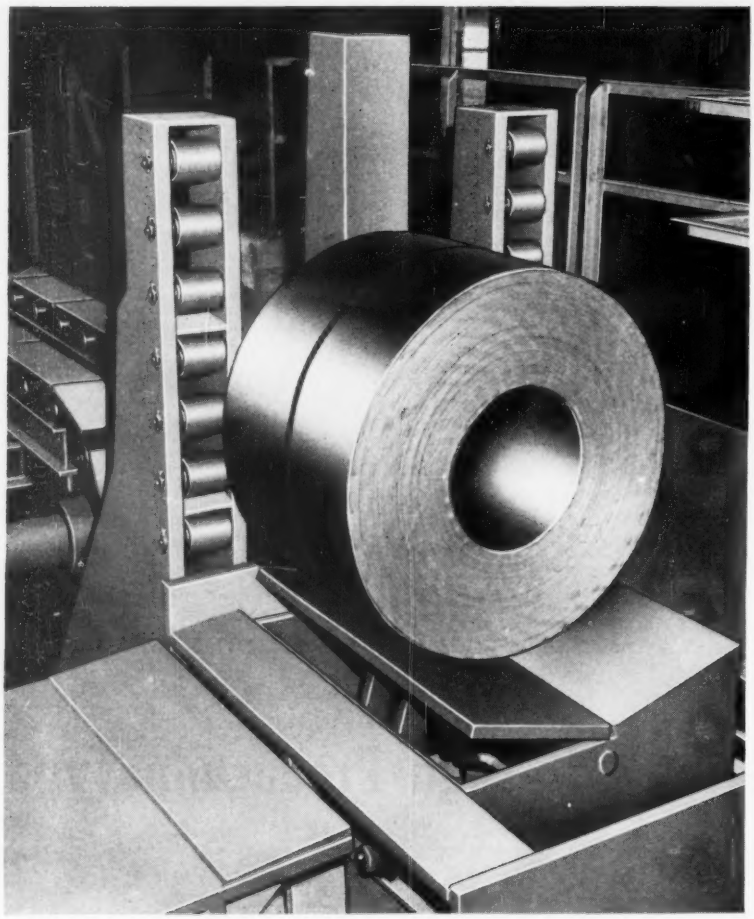
The unit is also designed to thread double end studs up to 11 in. long at high production rates. Additional speed changes to reduce the production rates for manual or semi-automatic feeding on short runs can be furnished. The die design is patented. The unit has a simple loading and unloading mechanism.

Stress support is provided by a tie bar. Longitudinal members are stressed in tension. Antifriction bearings are used for gearshafts and in the die spindle systems. Lubrication is automatic.

Other new units include a two die, Model B150 for infeeding of



# MATHEWS . . . A fully integrated conveyer service for the Metalworking Industries



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## NEW PRODUCTS and equipment

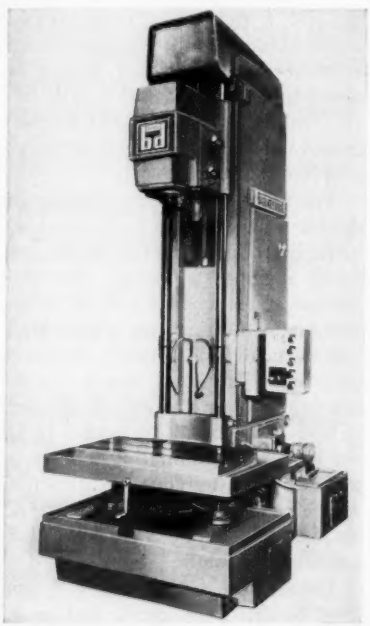
large diameter work and high speed production on parts 1 in. in diameter and under; Model B150T (similar to Model B150) with provision for throughfeed of long bars; Model A425, a three die model for throughfeed involute form rolling; and Model A25, a simplified throughfeed, thread rolling machine. The company has a display at The Machine Tool Exposition—1960, Booth 421.

For further information, *write* Reed Rolled Thread Die Co., Holden, Mass.

## Vertical Machine Hones Large Diameter Bores

SPINDLE travel of 25, 35, 45, or 60 in. is available on the Model 3010 vertical honer. It can hone bores up to 10 in. in diameter at maximum stroke and larger diameter bores in shorter lengths.

All electric controls are built into the two side panels. Two knobs on the right side of the head control spindle speeds. One knob selects neutral, low, or high speed ranges, and the other selects the specific speed in the low or high speed range. Eight speeds are provided by a 10 hp motor with a V-belt drive. A dial on the rear of the control panel



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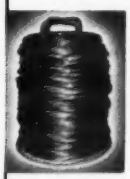
**MODERN WIRE PACKAGING FOR SPEEDING PRODUCTION**

**ECONO-COIL®**



The single length catch-weight coil that reduces scrap loss and down time in wire fabrication. Continuous length 1500# to 2500#, depending on finish and gage, reduces coil changes, cuts waste.

**LEVERPAK or PAYOFFPAK**

Modern drum containers protect wire against moisture, dirt; keep wire clean and safe. Handles 500# to 650# catch-weight single length coils, for sizes 14 ga. through 24 gauge. Other sizes on application.

One of these three special finishes may be just the thing to give your product added good looks and high quality appeal. Coppered: Extra smooth finish, for bucket bails, and many items like bag ties, card holders, baggage hooks. Tinned: Unusual brightness and luster, where appearance is important, as in lamp shade frames. Brytite®: Zinc coated wire with the plated look, takes hard turns and twists without flaking or powdering, for chains, display racks, bottle carriers, etc.

Smoothness of surface, lasting luster and uniform workability are hallmarks of Continental Wire, as proved in countless applications. Other finishes, in addition to those above are available, in various tempers and analyses, in low and medium low carbon steel. Your product's sales appeal may depend on Wire-Appeal! Write today for our wire manual.

*fine finishes in manufacturers' wire*

# CONTINENTAL STEEL

CORPORATION — KOKOMO, INDIANA

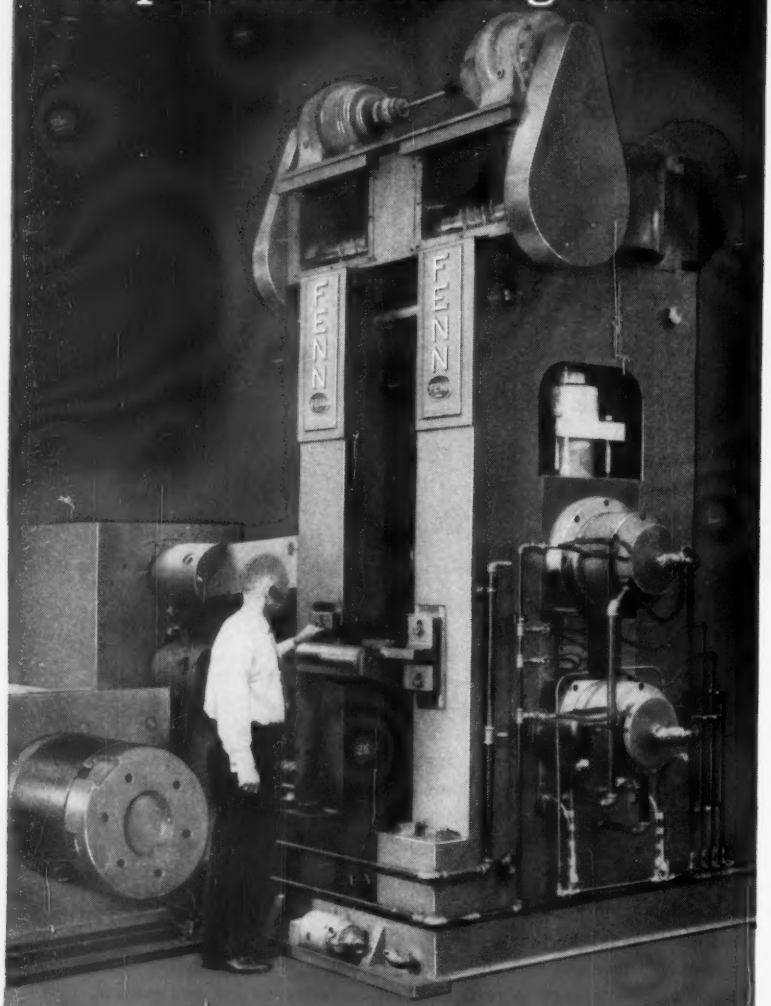
PRODUCERS OF: Manufacturers' Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, BRYTITE, Annealed, Liquor-Finished, Bright, and Special Shaped Wire. Also Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

With the big ones, too

FENN

Sets the Pace

in precision rolling mills




The inherent design of Fenn Rolling Mills achieves greater flexibility . . . extremely high separating forces . . . with dependability that only building to the highest quality standards can provide. Typical is the large heavy duty Fenn Precision Rolling Mill illustrated above. A combination Two-High/Four-High mill, with 16½" diameter rolls, it offers extreme versatility in rolling new alloys with high tensile strengths and is adaptable to either hot or cold rolling.

FENN MANUFACTURING COMPANY • 903 Fenn Road • Newington, Conn.

## NEW PRODUCTS and equipment

arm controls stroke length.

An electric hone expansion mechanism and Barnesdril Plugmatic bore sizing mechanism maintain size consistency within tens of thousandths from bore to bore at high production rates. Lights on the control panel warn when limitation of stone wear has been reached. Compensation for stone wear is automatic.

For further information, *write* Barnes Drill Co., 854 Chestnut St., Rockford, Ill.

### Chemical Solution Removes Corrosion

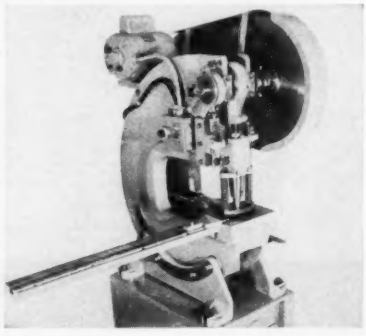
A CORROSION remover, Cor-O-Dex, can be applied to metal surfaces by brush, spray gun, cloth, or immersion. It's said to be effective on iron, steel (including stainless), brass, bronze, copper, nickel, and aluminum. The material can penetrate small cracks and shapes.

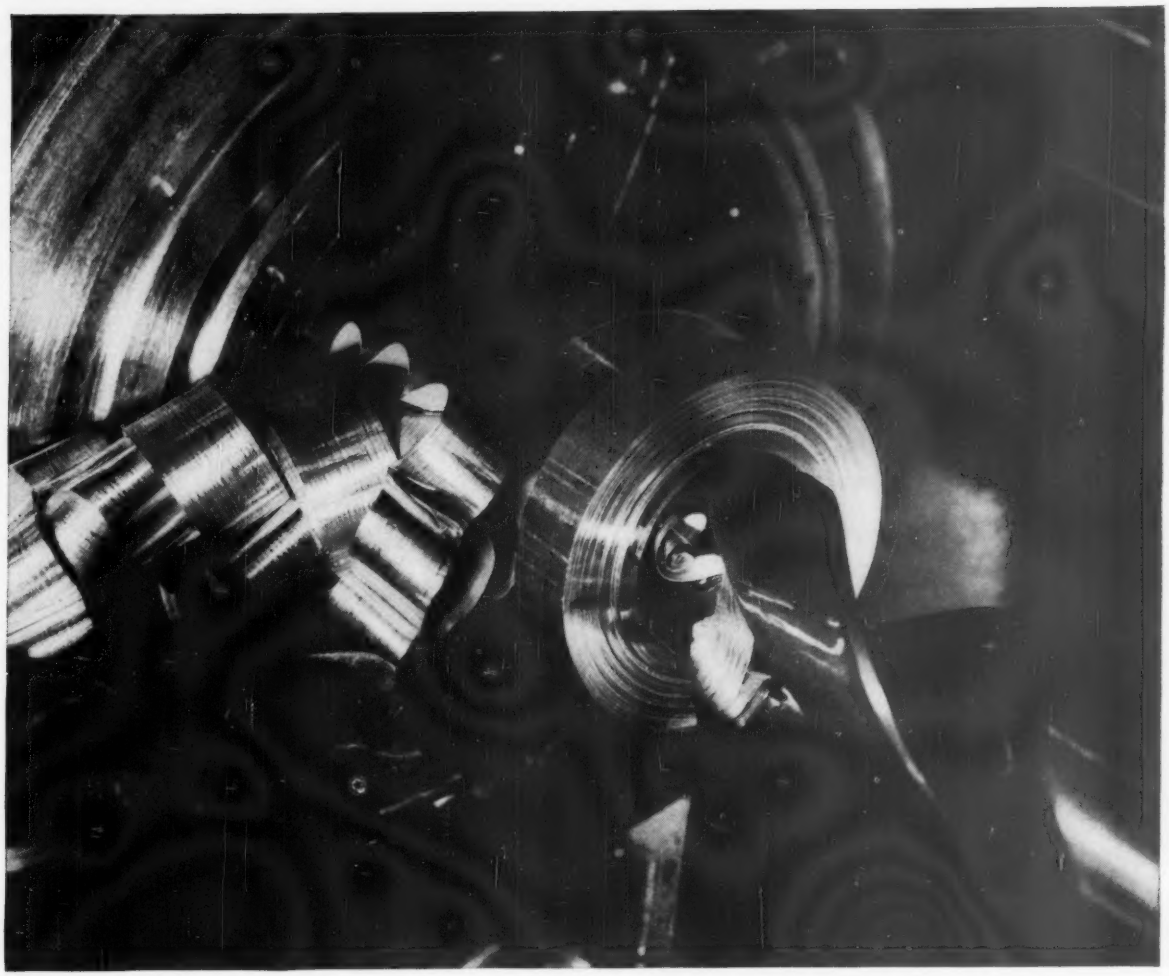
For further information, *write* Dept. S, Allied Products Co., 1133 W. Newport Ave., Chicago 13, Ill.

### 5 Ton OBI Press Works To Center of 24 in. Sheet

HIGH speed production operations can be handled by a five ton, OBI, punch press. The unit has a 12 in. throat depth and can work to the center of a 24 in. sheet.

Flywheel speed is 210 strokes per minute. The unit can be set up for continuous operation at that rate by removing the cam from the trip mechanism. The practical rate for single stroke cycling of the press is





# *Make "impossible" machining jobs easy ...with ALCOA ALLOY 6061!*

**• Tops in corrosion resistance!**
**• Superior finishing characteristics!**
**• Easily joined by soldering, brazing, welding!**

Alcoa 6061-T6 or -T651 is the most versatile of all the aluminum standard screw machine stock alloys. This alloy is best for applications requiring joining, brazing, welding or soldering. And 6061 defies corrosion! The most highly finishable of the aluminum alloys, it is especially receptive to color anodizing.

When you use Alcoa® Aluminum Screw Machine Stock Alloy 6061-T6 or -T651, a complete package of data and on-the-spot service is available to you . . . when and where you need it! And for those other "impossible" machining jobs, look to Alcoa 2011-T3 or -T8, 2017-T4 or -T451 and 2024-T4 or -T351.

Ask your Alcoa distributor or call your nearest Alcoa sales office for more information. Get your free copy of the *Alcoa Screw Machine Stock Estimating and Operating Data Book* . . . provides complete information at your finger tips . . . helps make the toughest machining job a cinch. Ask, too, for a free copy of the handy *Alcoa Conversion Calculator* slide-rule device that quickly computes costs, shows savings in making a switch from brass to aluminum. Aluminum Company of America, 845-J Alcoa Bldg., Pittsburgh 19, Pa.

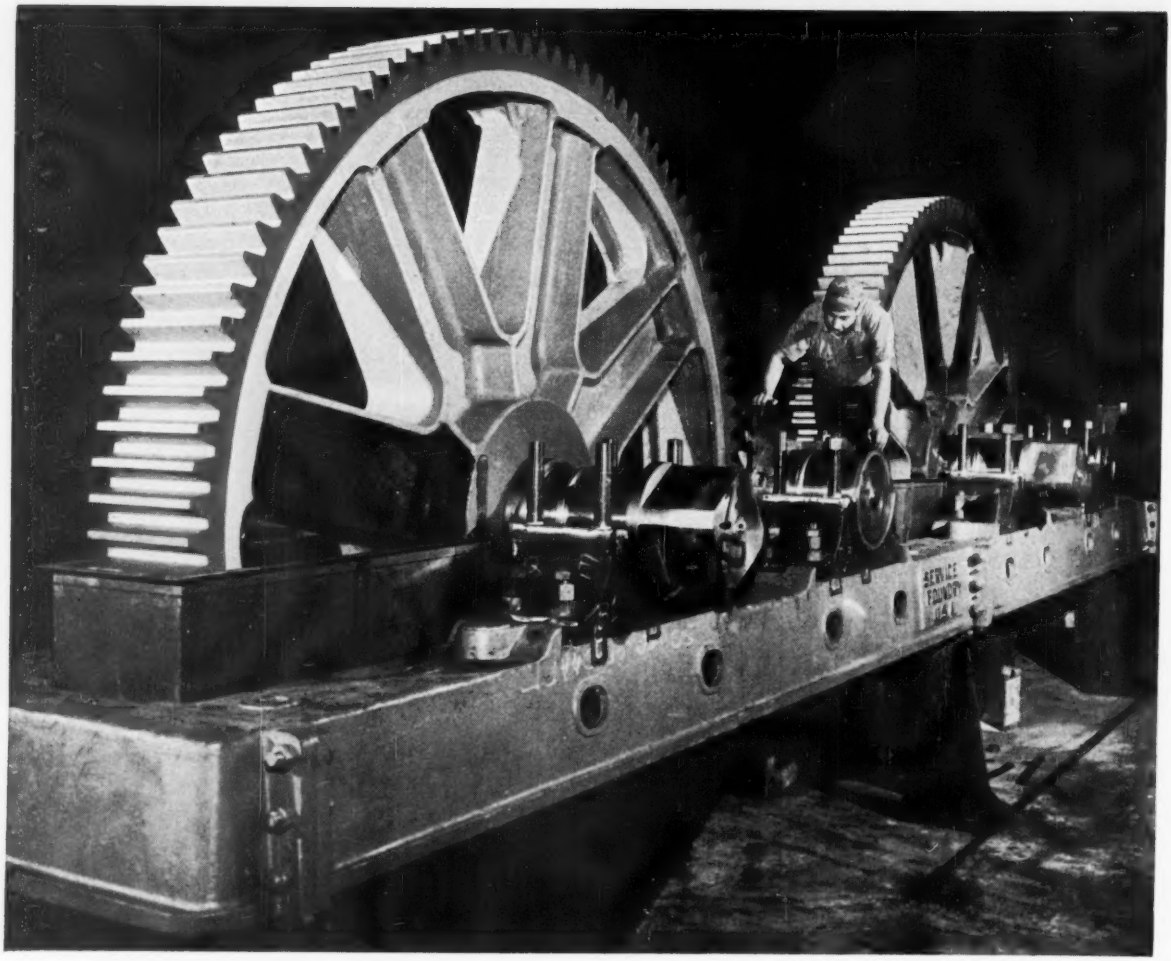
**"PLUS" bonuses — when you use Alcoa Aluminum Screw Machine Stock!**

1. Wide range of stock sizes.
2. Guaranteed market for up to 60 per cent of your Alcoa Aluminum turnings and borings.
3. Extensive mill and distributor inventories to cover all requirements.
4. Chamfered ends . . . at no extra cost.
5. Specific 12-ft lengths . . . at no extra cost (rounds up to 2¾ in.; hexagons up to 2 in.).

ALCOA ALUMINUM

SCREW MACHINE STOCK

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and "Alcoa Theatre" alternate Mondays, NBC-TV



# large cast steel gears by

## SERVICE FOUNDRY

Service Foundry Division of Avondale manufactures cast steel gears (plain or alloyed) up to 16'-1½" outside diameter and 30" face. Teeth are cut without limitation as to tooth form or size on a Gleason gear planer. Cast tooth gears are also manufactured. For large cast steel gears to your designs and specifications—contact Service Foundry.

**SERVICE FOUNDRY**

416 ERATO ST. • JAckson 2-3836 • NEW ORLEANS 13, U. S. A.

*A DIVISION OF* **AVONDALE SHIPYARDS, INC.**
FORMERLY AVONDALE MARINE WAYS, INC.

said to be 150 strokes per minute.

The material stripper is spring loaded and does not require adjustment for different material thicknesses. Changing from one job to another can be done quickly. After the punch and die set has been installed, it's only necessary to adjust the ram to compensate for punch length. Accessory equipment includes a dieholder and adjustable back and side gages (Exten-Tabl gage).

For further information, *write* O'Neil-Irwin Mfg. Co., 619 Eighth Ave., Lake City, Minn.

## Traverse Cutting Unit Has 20 in. Abrasive Wheel

THE Stone, high speed, traverse type cutting unit can handle ¾ to 1½ in. stainless and abrasion resistant plates (45 to 50 per cent carbon). Model T-20 can take plates up to 12 ft long.

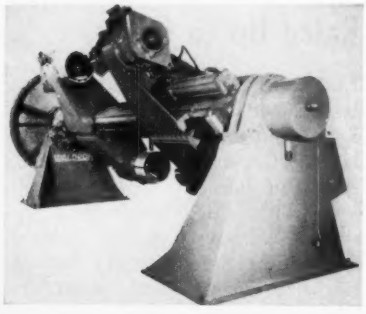
The 20 in. dry cutting abrasive wheel is powered by a 20 hp induction motor. It can cut ¾ in. plates at 3 to 4 ft per minute.

For further information, *write* Stone Machinery Co. Inc., 26 Fayette St., Manlius, N. Y.

## Uncoiler Handles 60 in. Diameters, 66 in. Widths

THE Model 12,000 uncoiler (for steel and aluminum strip) can handle diameters up to 60 in., widths from 18 to 66 in., and a maximum of 12,000 lb per coil.

The unit is quickly adjustable (through a control panel) to various coil diameters and widths. Each of



METAL COST CUT MORE THAN 65%...

...with miller 200-PLUS PHOSPHOR BRONZE

The wafer-thin part shown here is a spring contact blade that forms an integral part of an automatic starting and reversing switch used on all models of garbage disposers produced by In-Sink-Erator Manufacturing Company of Racine, Wisconsin. Continued exploration of ways to cut the cost of manufacture—hence deliver a better product for less money—led In-Sink-Erator's design people to Miller, whose on-the-spot metallurgical specialists were able to recommend Grade C 200-PLUS phosphor bronze, a material with equal performance to the beryllium copper previously used . . . yet at far less cost. If cost-cutting has a place in *your* operation, a Miller specialist can be at your plant in hours to tell you how!

miller SINCE 1904

ROLLING MILL DIVISION
THE MILLER COMPANY
MERIDEN, CONN.

...WHERE PHOSPHOR BRONZE IS THE MAIN LINE—NOT A SIDELINE

JF SERIES

# EASY SAFE EFFICIENT LIFTING!

**IT'S EASY** to raise or lower loads while pulling a trolley mounted Coffing Quik-Lift Electric Hoist. The pistol-grip control station and the combination strain cable and control cord makes this possible. The light but strong aluminum housing provides ease of portability. Changing voltages, limit switch, type of suspension or chain is quick because the housing is in sections.

**FOR SAFETY** the control station is made of non-conducting plastic in which the voltage is reduced to 115 volts and the push-buttons are interlocked. The V-type brake which provides maximum braking surface and positive control of loads is another safety measure.

**FOR EFFICIENCY** this hoist has been designed to bring heavy-duty performance plus durability to the portable hoist field. It will pay you to specify Coffing Quik-Lift. Twenty models—capacities range from ¼ to 2 tons. Ask your distributor for details or write for Bulletin ADH-65.

# COFFING HOISTS

**DUFF-NORTON COMPANY**

Four Gateway Center · Pittsburgh 22, Pa.

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear


## NEW PRODUCTS and equipment

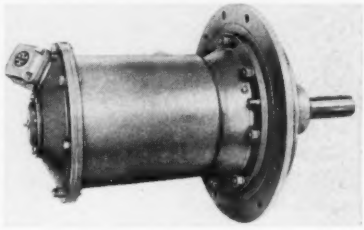
the cantilever arms, which are mounted on lateral slides, has an expanding mandrel for ease of coil pickup and release. Required strip tension is provided by electric brakes on each arm. An ac motor controls turret rotation.

For further information, *write* Waldron-Hartig Div., Midland-Ross Corp., New Brunswick, N. J.

## Improvements Made in Heat Resistant Motors

IMPROVEMENTS in the Series K-B heat resistant motor include one piece, Ductile iron body construction and "O" ring sealing.

The direct drive unit can handle shaft temperatures up to 2100° F under pressure, vacuum, and high ambient temperature conditions. The units are cooled by water, oil, or other suitable liquids.



Shaft lengths and end machining are supplied to suit applications. Standard units are available in sizes from ⅓ to 40 hp in standard 50 or 60 cycle induction motors. Two speed and special motors can also be supplied.

For further information, *write* Kaybee Engineering Co. Inc., 100 E. Quincy St., Westmont, Ill.

## Low Headroom Hoists Rated Up to 6 Tons

LOW headroom type hoists have been added to the Series 700 line of Load Lifter, cable type, electric hoists. Capacities range from 2 through 6 tons. The units are available with single and dual lifting speeds; push type, hand geared, and motor driven trolley suspensions; various lifts and speeds; and

Sundstrand ***RELY-ABILITY*** serves mobile equipment makers and users

## Start...stop...reverse...change speed with a single lever or pedal!

That's all there is to driving mobile farm and industrial machines equipped with the new Sundstrand hydrostatic transmission. This development by Sundstrand Hydraulics offers many operating benefits to equipment users and big sales advantages for equipment builders.

It eliminates maintenance-making clutch, transmission gears, drive train, and differential. It provides infinitely variable speed and automatic adjustment of torque to load for superior control and greater unit productivity. Simplicity of operation reduces operator fatigue and error—gets more work done per day.

Application possibilities for this remarkable propulsion system are widespread. If you use or build mobile equipment for farm or industry, the Sundstrand automatic drive system can make money for you. Complete details upon request.

Other products of Sundstrand Rely-Ability include: industrial hydraulic components and systems . . . machine tools and accessories . . . packaging machinery . . . fuel units . . . aircraft and missile systems and components . . . and a wide range of small tools and specialty equipment.

SUNDSTRAND **SUNDSTRAND CORPORATION**

**ROCKFORD, ILLINOIS**

Specify the

# T-J Spacemaker

**for longer, more efficient cylinder service**

You too—can reduce replacement expenditures—lower maintenance costs with the T-J Spacemaker cylinder line. Designed and engineered for ruggedness, and accuracy of operation, the Spacemaker assures longer, uninterrupted operation.

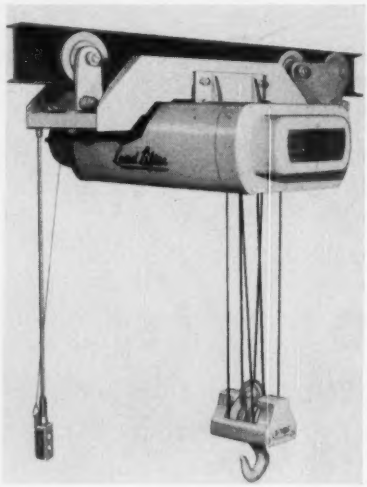
The T-J Spacemaker eliminates tie-rods, gives greater strength, saves space . . . and reduces costs in all push-pull operations. Immediate delivery in a complete range of styles and capacities . . . air or oil. Write for Bulletin SM 155-4, today. The Tomkins-Johnson Company, Jackson, Michigan.

**WITH EXTRAS . . . AT NO EXTRA COST**

1. METAL PISTON ROD SCRAPER—protects rod packing, cylinder bore and rod surface by removing all foreign particles.
2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
3. HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection and reduced wear.
4. ONE PIECE PISTON assures better alignment, longer bearing and packing life.
5. FORGED SOLID STEEL HEADS throughout entire line.
6. PILOTED PACKING GLAND with extra long bearing for additional strength and support to piston rod.
7. NO TIE-RODS TO STRETCH—gives you 360° port rotation . . . less space used . . . full strength.
8. STREAMLINED DESIGN . . . operating pressures to 200 PSI, air; 1,000 PSI oil, non-shock.

T-J TOMKINS-JOHNSON
RIVITORS . . . AIR AND HYDRAULIC CYLINDERS . . . CUTTERS . . . CLINCHORS


## NEW PRODUCTS and equipment



with arrangements for all standard, three phase currents.

A 24 volt pushbutton pendant control permits one hand operation of the hoist. A multiple disc, motor brake is used.

For further information, *write* Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore Inc., Muskegon, Mich.

## Spiral Bevel Type Speed Reducers Save Floor Space

FLOOR space savings are emphasized in a line of spiral bevel speed reducers. Each unit has a right angle shaft arrangement that allows placement of the prime mover alongside the driven equipment.

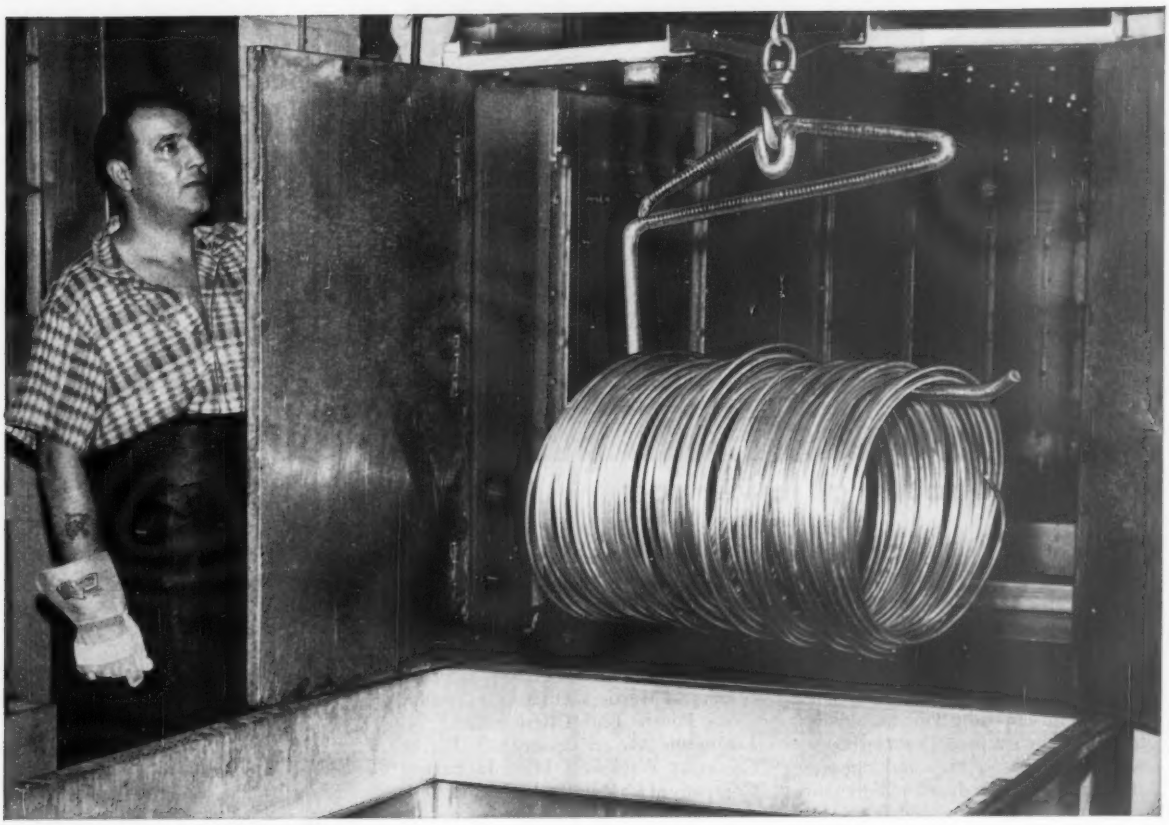
In many applications, use of bevel gear drives makes it possible to reduce motor size.

For further information, *write* Hewitt-Robins Inc., 666 Glenbrook Rd., Stamford, Conn.

## Deburring Compound Aids In Severe Cutting Down

MODERATE alkalinity and abrasives are combined in a compound for deburring metals in tumbling barrels. A 40 to 80 mesh abrasive in Oakite FM 182 speeds cutting action and shortens deburring cycles.

The compound is recommended



# 3-week life limit in hot $H_2SO_4$-$HNO_3$ mixtures...conquered by Ni-o-nel

## Ni-o-nel alloy still sound after 18 months

Are you looking for a metal to withstand constant attack by viciously corrosive hot acid *mixtures?* Perhaps the answer is Ni-o-nel* nickel-iron-chromium alloy . . . formulated to fight unusually severe corrosion.

Here's the kind of corrosion problem you can solve with Ni-o-nel alloy. In this processing cycle, first dip is 12% sulfuric acid with 8 ounces of sodium dichromate per gallon. Second dip is 60% sulfuric, 25% nitric, 0.2% hydrochloric acids. Both baths are heated to 160° F.

Leach & Garner Co. of Attleboro, Mass., manufacturer of precious and non-ferrous sheet, wire, and tubing, reports that just three weeks of this service used to ruin their pickling hooks. But a hook made of Ni-o-nel alloy bar stock was installed *18 months ago* . . . and still shows no sign of attack.

Ni-o-nel alloy is 42% nickel, 21.5% chromium and 30% iron with added molybdenum and copper. It's stabilized by additions of titanium and by a moderately low carbon content. Experience shows that this unusual alloy has excellent resistance to sulfuric acid in concentrations up to 40% by weight at boiling temperature . . . up to 60% at 80° C.

Ni-o-nel alloy resists oxidizing chemicals, too. Oxidizing salts other than chlorides usually *improve* its performance in sulfuric acid. That's why Ni-o-nel alloy delivers remarkably long service in mixtures containing nitric acid . . . cupric sulfate . . . ferric sulfate

Find out now where you can use Ni-o-nel alloy...a proved engineering material available in all standard mill forms including seamless tubing. They're easy to weld, form and fabricate. Want full details? Write for Technical Bulletin T-37, "Engineering Properties of Ni-o-nel." And let us know your problems with metals in corrosive service. Perhaps we can help you find practical answers.

*Inco trademark

**HUNTINGTON ALLOY PRODUCTS DIVISION**
**The International Nickel Company, Inc.**
**Huntington 17 West Virginia**

# NI-O-NEL®

## Added capacity at lower cost

Putting standard Delta 11" metalworking lathes on the job expanded the capacity of the lathe department at the Armaments Division of Universal Match Co., St. Louis, at surprisingly low cost. And, according to shop men, the Delta lathes work right alongside—and keep up with—costlier, heavy duty equipment. In addition to lowering initial tool investment, Delta lathes provide savings in set-up and operating time and greatly reduced maintenance.

This is another example of how thousands of metalworking plants are using rugged, versatile and highly accurate Delta Industrial Tools to supplement or replace special purpose machines. Write for free, 64-page illustrated booklet of cost cutting ideas: Rockwell Manufacturing Company, Delta Power Tool Division, 638J N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ont.

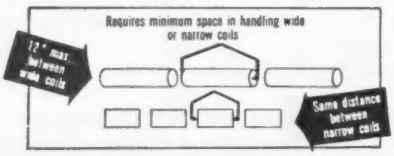
## Handling Coil Stock?

**CHECK THESE**

## C-F LIFTER ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles —saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles – a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for illustrated Bulletin.



**CULLEN-FRIESTEDT CO.**
1308 South Kilbourn Avenue • Chicago 23, Illinois

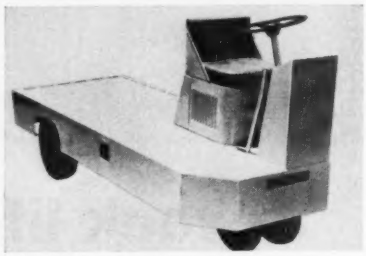

## NEW PRODUCTS and equipment

for severe cutting down operations. It has no adverse chemical action on metals and often enhances the color of the pieces, says the maker. It may be used in a range of 4 to 48 ounces per gallon of water (at room temperature).

For further information, *write* Oakite Products Inc., 134E Rector St., New York 6, N. Y.

## Torque Converter Drives This Platform Truck

A 4000 LB capacity platform truck comes equipped with a torque converter and an 18 hp, air cooled engine. It has automotive steering, dual front wheels, and heavy, box type, welded construction.



The unit (improved Model F-40A) is 42 in. wide with a 72 in. long cargo area behind the operator. Space to the right of the engine enclosure is 21 in. wide and 122 in. long.

For further information, *write* Prime-Mover Co., Muscatine, Iowa.

## Cushion Type Couplings Have Higher Ratings

TWO cushion type couplings for high speed or high torque applications are identified as Para-flex High Speed and Flywheel types. They're designed to operate at higher speeds and transmit greater torque than the original Dodge design.

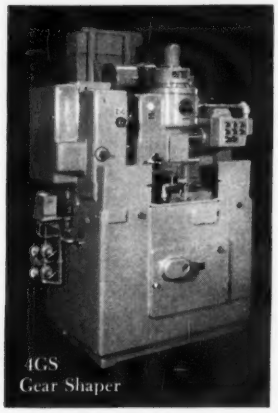
The High Speed coupling (up to 5230 rpm) has a flexible member supported on one side by a clamp ring flange (like those furnished with the tire type coupling) and has its larger side bolted to a steel disc.

The larger side of the Flywheel

**INVOLUTE GEARS**

**NON-INVOLUTE PARTS**

# FELLOWS GEAR SHAPERS DO DOUBLE DUTY



4GS
Gear Shaper

Fellows Gear Shapers are not limited to the production of gears alone. They are valuable production machines ideal for the manufacture of many types of parts, of both involute and non-involute form.

As gear shapers, they provide high production rates in the manufacture of internal and external spur and helical gears. As general purpose production machines, they also make possible the economical production of irregularly shaped parts . . . in many cases doing in one simple operation what would require several operations using conventional shop tools.

Your Fellows representative will gladly give you the facts on how the complete Fellows line of production and inspection equipment helps increase production and cut costs. Ask him, or write direct.

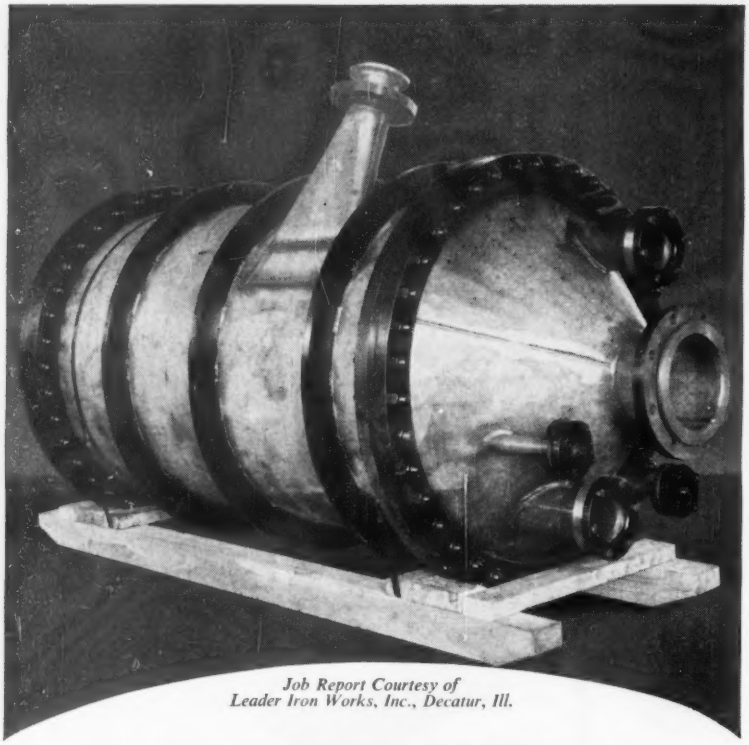
THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U.S.A.

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N.J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

**THE PRECISION LINE**

*Fellows*

*Gear Production Equipment*



*Job Report Courtesy of*
*Leader Iron Works, Inc., Decatur, Ill.*

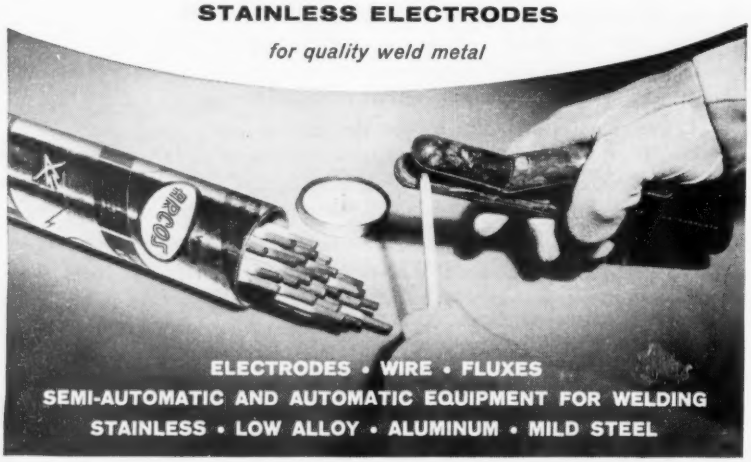
**For peace of mind**
**on any stainless welding job**

This vacuum separator, made of 5/16" Type 316 stainless steel, is designed for 100 psi test pressure. To assure *predictable* results, Arcos Chromend KMo Electrodes (Type 316) were selected for a *combination* of top physical, metallurgical and chemical properties. For maximum benefits in welding stainless—consistent quality, low cost weld metal, and reliability in service —you can count on ARCOS.

WELD WITH ARCOS

**STAINLESS ELECTRODES**

*for quality weld metal*




**ELECTRODES • WIRE • FLUXES**
**SEMI-AUTOMATIC AND AUTOMATIC EQUIPMENT FOR WELDING**
**STAINLESS • LOW ALLOY • ALUMINUM • MILD STEEL**

ARCOS CORPORATION • 1500 South 50th St., Philadelphia 43, Pa.

## NEW PRODUCTS and equipment

type bolts to the flywheel of an internal combustion engine. It fits bolt circles of most standard SAE flywheels up to 19¼ in. in diameter. The units absorb vibrations, prevent the flow of electricity between shafts, and require no lubrication. Sizes are available to deliver up to 47 hp per 100 rpm and with Taper-Lock bushings to fit shafts up to 4 in. in diameter.

For further information, *write* Dodge Mfg. Corp., Mishawaka, Ind.

## Turret Drilling Heads Fit 15 in. Drill Press Line

THE four and five position Quadrill turret drill heads fit the new line of 15 in. Walker Turner drill presses with 2 in. quill diameters.

The heads make it possible to quickly and economically convert the drill presses into highly versatile precision turret drilling machines.

For further information, *write* Chicago Quadrill Co., 1846 Busse Highway, Des Plaines, Ill.

## Seamwelder Makes Strong Circle Welds

RINGWELDING jobs from ¾ to 6 in. in diameter can be handled by the precision Wobble Head welder. The electrode is a circular cup type die running on an adjustable eccentric drive. The cup die works on edge, touching the workpiece with rolling (not sliding) point contact.

The electrode cup die is slightly larger in diameter than the weld

to be made and the specified ring diameter of weld is obtained by adjusting the tilt of the cup die.

Typical uses: Welding filler necks and large drains to tanks; welding heat exchanger tubes to header plates; and welder flanges to large diameter, thin walled tubing.

For further information, *write* Precision Welder & Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9, Ohio.

## Nonoil Lubricant Can Be Diluted with Water

IF YOU are stamping and machining hard to work metals you may want to try a lubricant called Anchorlube. It contains no oil, is odor free, is harmless to the skin, and will not corrode metals.

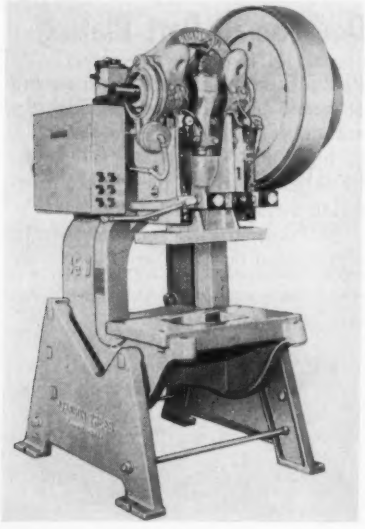
It can be applied by swab, spray, roller, or brush, can be diluted with water.

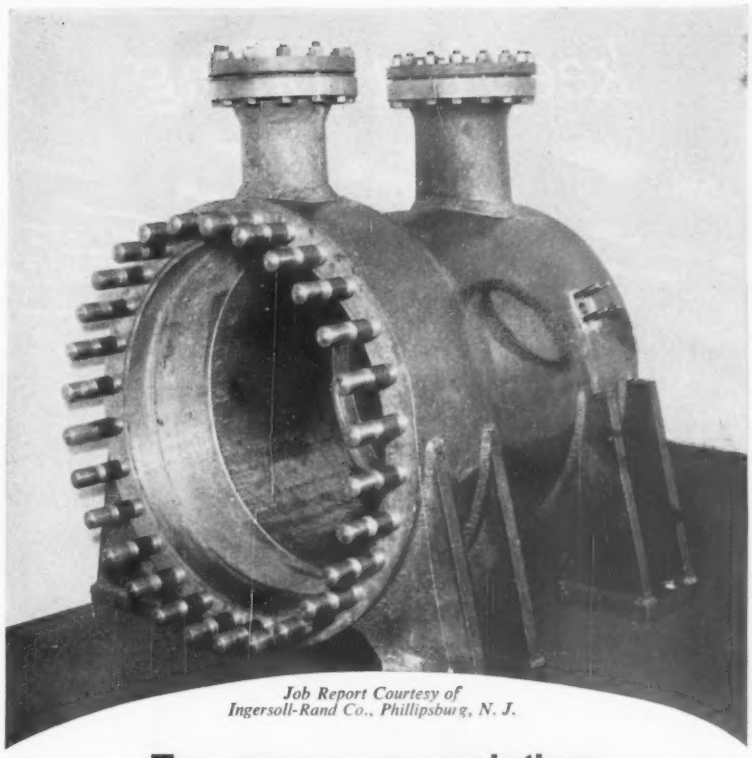
For further information, *write* Anchor Chemical Co., P. O. Box 2775, 10719 Briggs Rd., Cleveland 11, Ohio.

## Oversize Parts Featured On 45 Ton OBI Press

A 45 TON press (Model 45W) with oversize features has a 22 x 33 in. bed; a 15 x 22 in. ram face; a 21 in. opening through the uprights; and a throat depth of 12 in. It's available with a box type ram.

You can choose mechanical or



*Job Report Courtesy of Ingersoll-Rand Co., Phillipsburg, N. J.*

**For pressure resisting high strength low alloy welds**

The intake and discharge nozzle welds on this re-cycle compressor casing must provide high strength for long service life under rugged conditions. To assure sound, crack-free welds, Arcos Tensilend 70 Electrodes were used. These electrodes, especially suited for welding mild steel and low-alloy high-tensile steels, produce welds with a yield of 70,000 psi in the *as welded* condition. Use Arcos electrodes for the same dependable performance.

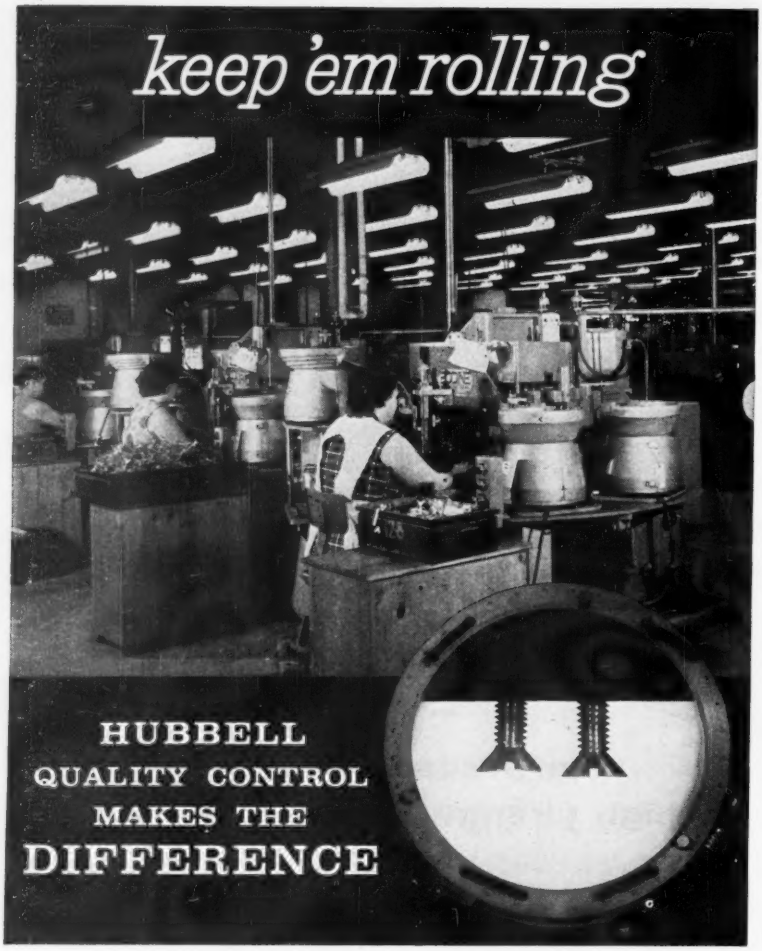
WELD WITH ARCOS

**LOW ALLOY ELECTRODES**

*for quality weld metal*

**ELECTRODES • WIRE • FLUXES**
**SEMI-AUTOMATIC AND AUTOMATIC EQUIPMENT FOR WELDING**
**STAINLESS • LOW ALLOY • ALUMINUM • MILD STEEL**

ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.




Without any warning, this smooth rolling production line could come to a screeching halt . . . all because of one imperfect fastener. You've had it happen all too often. Suddenly an automatic machine clogs and everything stops dead and stays stopped until the clogged machine can be fixed.

Hubbell precision fasteners are your best insurance against production snafus like this, because they are quality controlled at every step of manufacture to provide as uniformly perfect cold headed products as is humanly possible. It's our job to weed out the duds like the one at left in the viewmaster above, and supply uniformly perfect fasteners like the Hubbell one at right.

Contrast the two. Note how the Hubbell fastener at right is completely free of burrs or dirt that might jam an automatic machine. Also see how sharp and clean the threads are, and how deep and precise the slot. All these things add up to faster production, less down time, fewer rejects and a better end product.

Yes, if it's easier to fasten, it's easier and cheaper to assemble. Buy Hubbell precision fasteners and see.

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

*Quality* FASTENERS

HARVEY HUBBELL, INCORPORATED
Machine Screw Department, Bridgeport 2, Connecticut

See the Hubbell Fastener Catalog in Sweet's Product Design File 7/Hu.

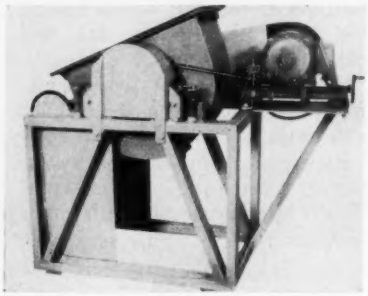

## NEW PRODUCTS and equipment

Wichita air clutch, flywheel or single geared drive, standard or oversize flange ram (15 x 26 in.).

For further information, *write* Johnson Machine & Press Corp., 620 W. Indiana Ave., P. O. Box 426, Elkhart, Ind.

## Small Parts Finished In Vibratory Unit

A VIBRATORY, part finishing machine can deburr such things as small motor housings, electronic parts, and zinc diecastings.



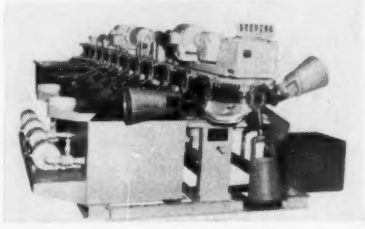
The finishing medium surrounds the parts at all times. The flow pattern of the medium induces pressure on the parts. The luster is produced without deformation.

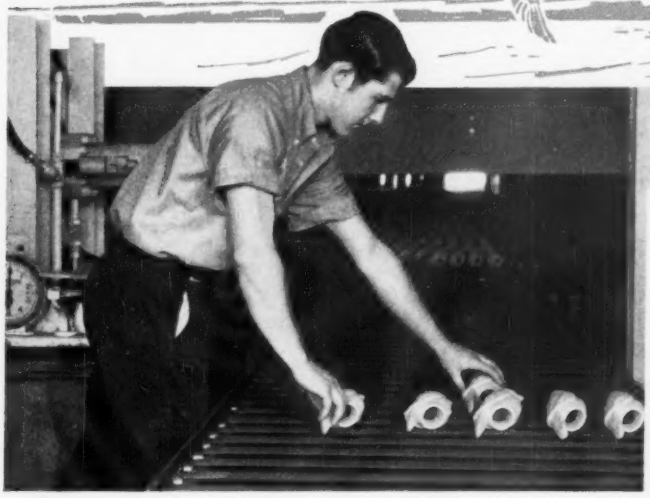
For further information, *write* Ultramatic Equipment Co., 1948 N. Cicero Ave., Chicago 39, Ill.

## Automatic Barrel Machine Does Small Part Plating

PRECISION plating and processing of small parts can be done in an automatic barrel machine that is 4 ft high and 6 ft wide. It can be quickly adapted to meet most processing requirements.

A "skip track" feature permits elimination or addition of any proc-





Three steel-slat conveyors move decoys through 90-foot, two-unit oven. Precise automatic control of temperatures and conveyor speeds prevents case hardening or warping. Despatch oven is equipped with wide range of temperatures and conveyor speeds for processing of various fiber products.

Varnish bath is applied in conveyorized unit. Decoys then enter Despatch conveyorized varnish baking oven. Space has been conserved by making oven U-shaped; heating units are located atop oven. Length of varnish baking oven is 48 feet.

## ...WITH PITH DECOYS—DRIED AND FINISH BAKED IN DESPATCH *Conveyorized* OVENS

Yes, when the flight's in, it's time for things to start happening according to careful plan—whether you're at your favorite duck pass or on the finishing line for pith decoys.

That's why Despatch was called upon to design, build and install a new conveyorized finishing line for the General Fiber Company, St. Louis, Mo., manufacturer of duck decoys and other molded products.

Vice-president Erwin Bry reports these results:

- Handling losses which ranged as high as 15% reduced to "negligible;"
- Mold drying production increased 100%;
- Finish baking production increased 30%; and
- Product quality improved due to "more effective" control measures.

The new Despatch installation also realized great savings in plant area, reduced equipment inventory, and increased worker productivity.

These profit-building benefits are, we like to think, the result of Despatch's 58 years of serving American industry. Despatch has the know-how to design heat processing equipment for your plant on request, or collaborate with your engineering staff to develop new production speeds and quality control processes.

Excellent engineering facilities plus a modern plant gear Despatch to produce whatever you need in industrial heat applications, washing, chromic acid treatment, finish coating and other operations in product drying or finishing.

Complete finishing systems are one of our specialties.

There is a Despatch resident engineer near you. Let him talk with you about your particular needs. You'll find him informative and helpful . . . and, of course, there's no obligation.

For a more detailed description of our installation mentioned above, please write today.

DESPATCH OVEN CO.

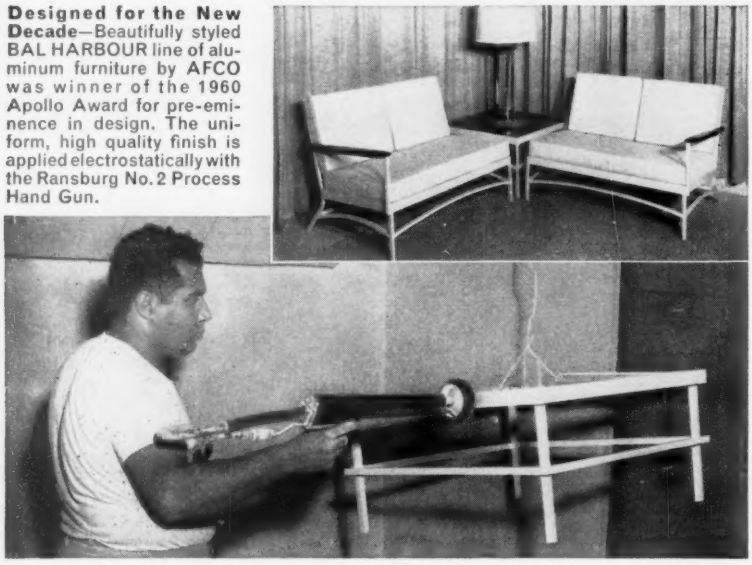
DESPATCH OVEN CO. 619 S.E. 8th St., Minneapolis 14, Minn.

## What Would

# 75% PAINT SAVINGS

## Mean in YOUR Finishing Department?

**Designed for the New Decade**—Beautifully styled BAL HARBOUR line of aluminum furniture by AFCO was winner of the 1960 Apollo Award for pre-eminence in design. The uniform, high quality finish is applied electrostatically with the Ransburg No. 2 Process Hand Gun.



**Faster . . . Cleaner . . . Cheaper**—The "wrap-around" feature of the No. 2 Process Electrostatic Hand Gun paints all areas of this type of work from one side only, providing a 75% paint savings and a 700% increase in production volume over former air hand spray.

RANSBURG

Ransburg No. 2 Process Electrostatic Hand Guns are providing a 75% paint savings in the painting of beautiful AFCO aluminum furniture.

AFCO Aluminum Furniture Co., Inc., Miami, Fla., replaced hand spray with two Ransburg Electrostatic Hand Guns. Along with paint and labor savings, quality of the work was improved with greater uniformity. And, production volume was increased a healthy 700%! Formerly, they were painting approximately 100 items a day. NOW, with the faster, cleaner Electrostatic Hand Guns, they paint from 700 to 800 pieces per day. Electrostatic is faster because the "wrap-around" characteristic of Electro-Spray paints all areas of this type of work with a pass from one side only.

**NO REASON WHY YOU CAN'T DO IT TOO**

Write for information and literature about this revolutionary, new painting tool. See how the Ransburg Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. If your production justifies, it'll pay you to investigate Ransburg's *automatic* electrostatic spray painting equipment. Write for our No. 2 Process brochures which show numerous examples of modern production painting in both large and small plants.

RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

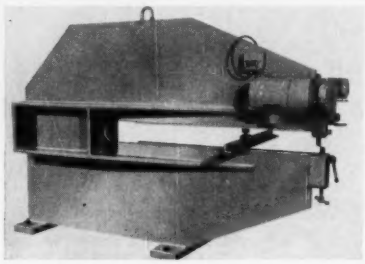



essing step by simple mechanical adjustment. Built-in dryers are available. Manual opening and closing of barrels has been eliminated (lids are not required on Stevens oblique barrels).

For further information, *write* Frederic B. Stevens Inc., 1800 18th St., Detroit 16, Mich.

## Shearing, Forming Units Come in Five Models

STRAIGHT, circular, and irregular shearing, plus slotting, folding, beading, joggling, edge bending, and louver cutting can be done on any of five universal shearing and forming machines in this line.



Capacities of the line range from 14 gage up to 7/32 in. in mild steel. Throat depths range from 15 to 49 in.

For further information, *write* American Pullmax Co. Inc., 2455 N. Sheffield Ave., Chicago 14, Ill.

## Cold Forming Machines Feature Improved Design

THREE improved Roto-Flo machines for cold forming splines, serrations, and similar forms are said to offer increased versatility and flexibility for short runs of a variety of parts and long runs on a single part.

Improvements include hardened and ground ways, synchronizing racks and gear; hydraulic and electrical safety interlocks; and an exterior hydraulic power unit for easy accessibility.

Forming racks 24 in. long can be accommodated on Model 3225; 36 in. forming racks on Model 3237; and

# STRAPS SIZZLING COILS BY REMOTE CONTROL!

*Acme Idea Man William Whyte helped develop Idea No. U8-1, at Dominion Foundries and Steel, Ltd., Hamilton, Ont.*

One of Canada's leading basic steel producers keeps in step with increased coil-making capacity with a first-of-its-kind tying method engineered by Acme Steel—the F5 Strapping Machine.

This new innovation is customized into a push-button automatic, remote controlled strapping station. It ties 5 to 14 ton hot coils in 12 seconds! Operation is simple and safe. Strapping is applied, tightened to uniform tension, sealed and cut—all by one push-button.

We've prepared a colorful 12-minute sound film of this entire operation for group showing. For arrangements, write on your letterhead to Acme Steel.

**ACME STEEL**

**IDEA LEADER IN**

**STRAPPING**

ACME STEEL COMPANY
Acme Steel Products Division
Dept. SB-90
135th St. & Perry Ave.
Chicago 27, Ill.

Please send me Idea No. U8-1 and examples of how major companies in my field use Acme Steel Strapping.

*Name*_____

*Title*_____

*Firm*_____

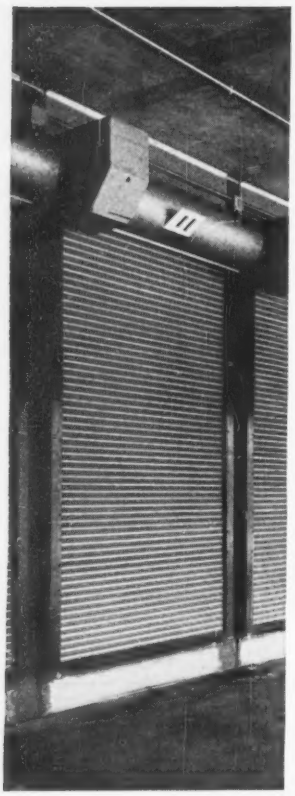
*Address*_____

*City*_____ *Zone*_____ *State*_____

# *Kinnear* Motor Operated *Rolling Doors...*

*a feature of Theo. Hamm Brewing Company's*

## Automated Loading Dock



Here again, Kinnear Rolling Doors play a key role in *modern efficiency at its best!*

The 23 power-operated Kinnear Rolling Doors you see above are controlled independently from a master switch.

Conveyors ending just inside each door deliver pallets holding cases of beer to the loading dock. The door can then be opened by remote control. A fork truck picks up the pallets, travels onto dock levelers (at right, top photo) and loads the pallets on the waiting truck.

(Empty cases on pallets are returned to other conveyors through doorways installed higher above the dock level.)

By opening straight upward and coiling compactly over the doorway Kinnear Rolling Doors permit conveyors to come within *inches* of the door. Doors can be placed as close together as desired, with control switches at each door if preferred.

(Auxiliary chains, for door operation in case of power failure, are stored in the hood of each door.)

A rugged, all-metal curtain protects each opening when the Kinnear Rolling Door is closed — a positive barrier to trespassers, vandals, wind, and weather, *plus added protection against fire.*

Your needs may be vastly different; but *wherever you need* doors, you need the advantages of Kinnear Rolling Doors.

**The KINNEAR Manufacturing Company**

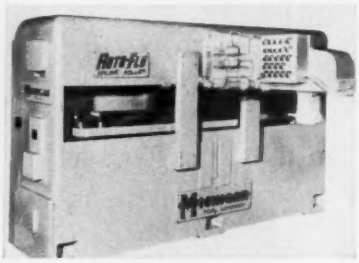
FACTORIES:

1780-1800 Fields Avenue
Columbus 16, Ohio
1742 Yosemite Avenue
San Francisco 24, Calif.

Offices and Agents in All Principal Cities

**KINNEAR**
**ROLLING DOORS**
*Saving Ways in Doorways*


## NEW PRODUCTS and equipment



55 in. racks on Model 3251. On the large models, it is often possible to form a spline and a thread in one pass.

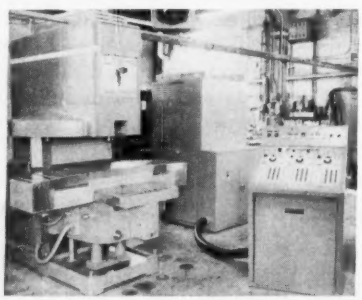
For further information, *write* Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

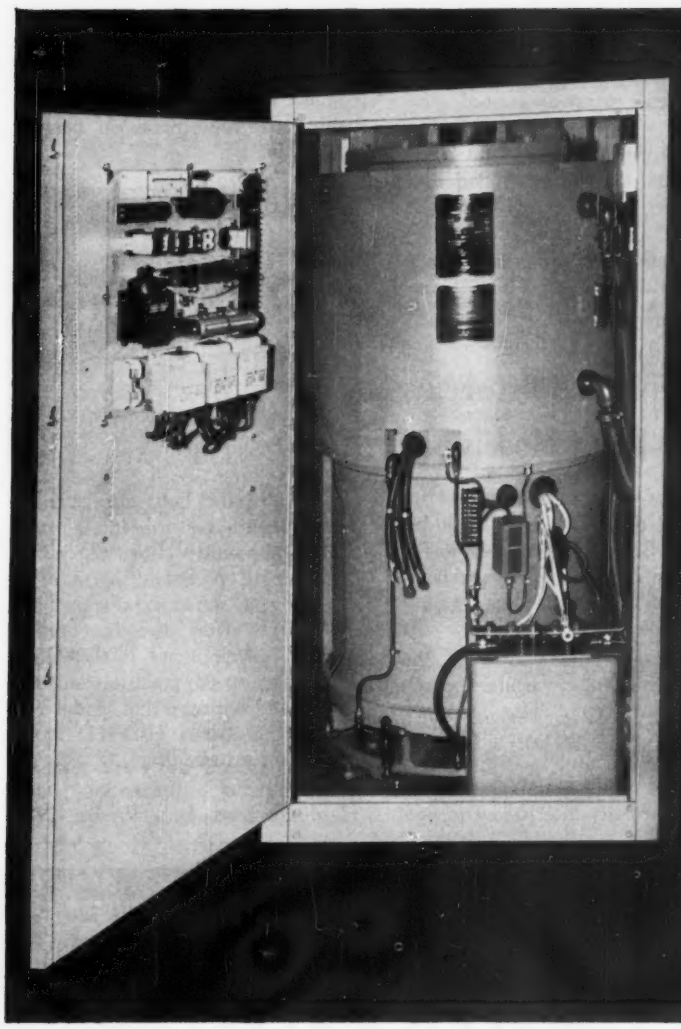
### Numerical Control Unit Carries 30 Machining Tools

THE Spindlemaster provides a programer with 30 tools to machine a part by drilling, tapping, reaming, boring, and milling. Tools are carried in a magazine that rotates (in either direction) to bring the new tool to the spindle by the shortest path. Tool selection is made while the table is positioning the part for the next operation. Tools are picked up or deposited in the magazine while the spindle passes through the magazine at power rapid traverse rate. The machine comes with General Electric Mark III (modified) numerical control.

Each machine function is tape controlled. Such things as rapid traverse, feed, spindle retract, spindle reversal, and clamping are performed automatically and in sequence by calling for a specific mode of operation.

The numerical control system has a manual control (pushbutton) which can be used for making a





- FORCED OIL LUBRICATION of the upper and lower bearings gives twice the normal expected bearing life.
- ALL AUXILIARY COMPONENTS are safely contained and mounted within the heavy gauge steel enclosure.
- EASY ACCESS for servicing or inspection without disassembly of cabinet or shroud.
- SINGLE OVERSIZED AREA water to air heat exchanger provides cooling.
- SPECIAL ROTOR LOCKING DEVICE prevents brinelling of bearings during shipment.
- FULL COMPLEMENT OF PROTECTIVE DEVICES including an annunciator panel.

The AM Motor Generator Unit is a proven Vertical Design with new features to improve service life and maintenance.

# WATCH AM

FOR THE NEW IDEAS IN THE HEATING AND MELTING OF METALS BY INDUCTION

## HIGH FREQUENCY MOTOR GENERATOR SETS

*Another of the many products of AM for the heating and melting of metals by induction.*

*"induction heating is our only business"*

Ajax Magnethermic CORPORATION

**GENERAL OFFICES**
P. O. BOX 839
Youngstown 1, Ohio
**TRENTON DIVISION**
930 Lower Ferry Road
Trenton 5, New Jersey
**YOUNGSTOWN DIVISION**
3990 Simon Road
Youngstown 1, Ohio
**AJAX MAGNETHERMIC, CANADA, LTD.**
BOX 779
Ajax, Ontario

single part. Every control possible by tape is duplicated in the manual control. The company has a display at The Machine Tool Exposition—1960, Booth 632.

For further information, *write* Cleereman Machine Tool Corp., Green Bay, Wis., or Jackson-Fotsch Co., 7350 W. Lawrence Ave., Chicago 31, Ill.

## Power Needs for Steel Belt Conveyor Low

LOWER horsepower requirements, simplified assembly and installation, reduced body depth, and a belt design that permits conveyor lengths up to 500 ft are featured on the Armorbelt conveyor.

A continuous Speedbar channel on both sides of the conveyor permits the fastening of side tables, deflectors, electric controls, and other attachments at any point along the sides without drilling. The zinc coated, steel belt is available in 12 to 36 in. widths. The gap between the slats does not exceed 0.015 in. even when turning around the sprocket.

The conveyor is made in 10 ft sections that can be assembled into a one piece conveyor up to 500 ft long.

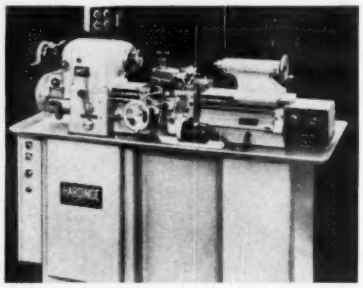
For further information, *write* M-H Standard Corp., 515 Communipaw Ave., Jersey City 4, N. J.

## Lathe Fills Gap Between Engine, Bench Models

THE HLV-H lathe includes the features of the HLV series made by Hardinge Bros. It's designed to fill the gap between the plain precision bench lathe and the heavy duty engine lathe.

It has an 11 in. swing over the bed and infinitely variable speeds of 125 to 3000 rpm. The headstock spindle has a through collet capacity of 1-1/16 in. and a step chuck capacity of 6 in. The spindle lock pin is electrically interlocked to prevent starting the main drive motor when the pin is engaged.

The headstock drive belt can be changed without removing or disturbing the high precision bearing or spindle.

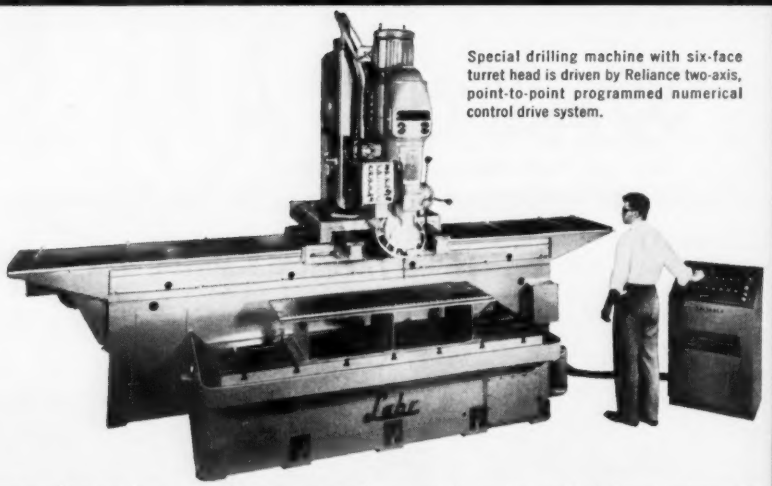


The lathe has built-in, automatic thread length control and a quick acting compound slide for threading. Accuracy in precision threading is aided by a separate gearbox and lead screw (for threading only). Another development is the Model TFB high speed precision turning, facing, and boring lathe. Model TFB (similar to Model HLV-H) is not equipped for threading.

For further information, *write* Hardinge Bros. Inc., Elmira, N. Y.


# RELIANCE PROGRAMMED NUMERICAL CONTROL

## a complete system for automatic positioning of machine tools



Special drilling machine with six-face turret head is driven by Reliance two-axis, point-to-point programmed numerical control drive system.

**Cutting the costs** of lead time and expensive tooling, as well as maintaining high accuracy, Reliance Programmed Numerical Control brings to industry a complete, engineered positioning system. Using resolvers, or resolvers with scales and sliders, extremely accurate position information is compared with the numerical input, and the difference used to drive the positioning motors.

# NEW literature

Write directly to the company for a copy

### Ultrasonic Cleaning

Bulletin 60-1 details the advantages of ultrasonic cleaning. It includes a chart type guide to the correct cleaning solutions and temperatures for ultrasonic removal of more than 20 common contaminants. Powertron Ultrasonics Corp., Patterson Place, Roosevelt Field, Garden City, N. Y.

### Strapping Calculator

A calculator for Signode strapping can compute such things as strapping requirements for packages, production runs, cost per foot for each variety of strapping, and quantities at which price breaks are available. Signode Steel Strapping Co., 2600 N. Western Ave., Chicago 47, Ill.

### Surface Plates

A brochure discusses granite surface plates. It covers such things as accuracy, wear resistance, hardness, density, and cleaning. Rahn Granite Surface Plate Co., 641 N. Western Ave., Dayton 7, Ohio.

### Water Treating Systems

A booklet describes water treating systems used in the processing industries and shows how instrumentation has been applied. Ask for Industry Bulletin B96-2. Industrial Div., Minneapolis-Honeywell Regulator Co., Wayne & Windrim Avenue, Philadelphia 44, Pa.

### Fastener Standards

A 10 page reference listing provides rapid identification of more than 160 standard aerospace fasteners by configuration, specification number, and generic name. They're indexed numerically by part number in three separate groupings (NAS, AN, and MS). Box 579, Advertising Dept., Standard Pressed Steel Co., Jenkintown, Pa.

### Data Analysis

Edgegraphing, a technique for hand analysis of complex engineering data in 10, 20, or more variables is included in 16 pages of technical literature. Statistical Engineering Institute, 8 Fuller Rd., Wellesley, Mass.

### Brushing Tools

The versatility and adaptability of brushing tools to industrial jobs is emphasized in a bulletin containing case histories. American Brush Manufacturers Association, 1900 Arch St., Philadelphia 3, Pa.

### Mounting Sensing Elements

A bulletin on "Mounting Sensing Elements" describes methods of mounting temperature and strain measuring elements by ceramic spray coatings. The technique is being used in areas subject to high temperatures. Ask for Bulletin H-3.1. Advertising Dept., Norton Co., Worcester 6, Mass.

## NEW BOOKS

*Guide Book: Quality Control of Hot Dipped Galvanized Coatings*, Midwest Galvanizers Association, Box 72, Chicago 50, Ill., 40 pages, $1

Characteristics and benefits of good galvanizing are emphasized. The booklet describes how galvanizing quality is produced in the alloy structures of galvanized coatings. Maintenance of high quality control standards in processing, causes of objectionable galvanizing defects and effects they produce, and certain assembly defects of fabricated items that cause difficulties in galvanizing are covered.

*Air Pollution Manual, Part I Evaluation*, American Industrial Hygiene Association, 14125 Prevost, Detroit, Mich. 194 pages, $8.50 to nonmembers, $5.50 to members

Procedures for evaluating air pollution are explained in detail. Public and community relations are discussed and methods of handling complaints are presented. Topics discussed include the effects of air pollution on health, on vegetation, and on farm animals; the economic effects of air pollution, and community air sampling. Odors, radioactivity, and meteorology are also covered in detail.


**The Reliance drive** provides fast, high accuracy positioning by operating the motors at high speed until the final position is approached. The motors are then slowed down in proportion to the distance from the programmed point, stopping at the exact position. Any number of linear or rotary motions can be controlled simultaneously or individually for completely automatic operation. Provision can also be made for auxiliary functions such as turret selection, clamping, and coolant control.

**Reliance Programmed Numerical Control** utilizes 8 channel tape or dial selector switches for input. Numerical indicator tubes can be provided for readout.

Here is what you get when you buy Reliance:

- Absolute system—operates from zero reference with no cumulative error.
- Positions from either direction.
- Uses standard machine tool tape, with standard tape processing and reading equipment.
- High Accuracy—electrical accuracy of ± .0001 inch and repeatability of .00001 inch can be achieved.
- Powered by Reliance Super 'T' D-c. servo motors . . . small diameter, low inertia, dynamic response.

**Reliance systems** are of industrial construction, and are sold and serviced by a nationwide organization. For more productive machine time, for greater machine utilization, you'll want to know the complete facts about Reliance Programmed Numerical Control. Call your nearest Reliance Sales Engineer, or write direct.

*See the Reliance Numerical Control in operation at the Production Engineering Show, Navy Pier, Chicago, Ill., Sept. 6-16, Booth 411-417*

D-1678

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 49A CLEVELAND 17, OHIO

Canadian Division: Toronto, Ontario

Sales Offices and Distributors in Principal Cities

Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems

# RED CIRCLE SERVICE

## ...MAKES DELIVERY WHEN YOU WANT IT

Customers find Acme-Newport the perfect source for quick delivery of grades and sizes needed to keep their stocks in balance. Flexibility of operation, modern facilities, long experience, and central location enable this mill to fill special orders to exact specifications, in a minimum of time. These orders are marked *Red Circle Service* to speed them through every department, from order desk to shipping department.

Let Acme-Newport help balance your stocks without running the hazard of sudden depletion of certain items. Mark your orders *Red Circle Service!*

● RED CIRCLE SERVICE

**PRODUCTS OF ACME-NEWPORT STEEL**

Hot Rolled Steel in Coil
Hot Rolled Pickled Steel in Coil
Hot Rolled Sheets
Hot Rolled Pickled Sheets
Cold Rolled Steel in Coil (*full hard only*)
Cold Rolled Sheets
Alloy Sheets and Plates
Plates (5/16" *and lighter*)
Electrical Sheets
Electric Weld Line Pipe
Spiral Welded Pipe

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY

# Steel Buying Gains Momentum

FINISHED steel demand is increasing slowly, providing an encouraging note in a market that has been awaiting a definite buying upturn for many weeks. Steelmen are booking small orders more actively. One Midwestern mill reports daily receipts gained for four consecutive weeks; the latest week's tonnage was the best since February. Another mill's orders are the best since April. Indications are September volume will top August's by at least 10 per cent.

**ANOTHER SIGN—** Some automotive tonnage originally scheduled for late August delivery is going out from the mills. That means September will experience a noticeable pickup in deliveries. Sheet steel executives say automotive industry buying (for October shipment) is now in highest volume in many months. Generally, developments in autos will point the way for steel the rest of this year.

**INVENTORIES SHRINKING—** Consumer stocks are still acting as a damper on new steel buying. Inventories vary all over the lot, but there are signs they are leveling out as depletion progresses steadily. Consumption is running ahead of incoming shipments, so that it's believed that buying, at least for prompt shipments, can't be put off much longer. In this regard, buyers can obtain many products from the mills within three weeks, and until there's a tightening in delivery promises, there's little likelihood there will be much stock rebuilding. However, a shift in policy could come before the end of this month.

**STEEL RATE SLIPS—** There is still doubt that September steelmaking operations will exceed the August level. That's because September order books are relatively light and also because railroad labor trouble (strikes on the Pennsylvania and interplant roads at Pittsburgh, Cleveland-Lorain) are holding back some production. Last week, national ingot production was estimated at 1,441,000 net tons; the ingot rate averaged 50.6 per cent compared with 52 per cent the preceding week, when 1,483,000 tons were poured. Part of the drop was due to curtailments over Labor Day. Quick recovery may be stymied by the rail strikes.

**RAILROAD TROUBLE—** Some steel shippers and consumers have been inconvenienced by the Pennsylvania Railroad strike. In general, though, diversion of shipments to trucks has been effected without too much difficulty. In the East, the movement of scrap for export has been slightly hampered. At Pittsburgh, there has been partial resumption of steel operations that had been curtailed by the strike on a connecting interplant railroad. At Lorain, Ohio, an interplant connecting road strike at the National Tube Div. Works, U. S. Steel, closed down the blast furnaces and bessemers, but the coke ovens, open hearths, and finishing mills continued to operate; open hearths were put on cold metal charges. At Cleveland, blast furnaces and coke ovens of the American Steel & Wire Div., U. S. Steel, were forced down by the local interplant connecting road strike, but the finishing mills were unaffected.

**PRICES—** U. S. Steel posted prices on its new, ultrathin tin plate, which is about half the thickness of standard tin plate for canmaking. It's quoted $6.10 to $6.65 per base box of 45 to 60 lb, f.o.b., Pittsburgh, Fairless, Pa., Gary, Ind., and Fairfield, Ala. The new product is priced $3 under standard tin plate weighing 100 lb per base box.

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*Current prices were published in the Sept. 5 issue and will appear in subsequent issues.

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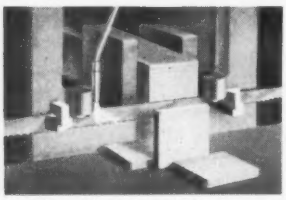

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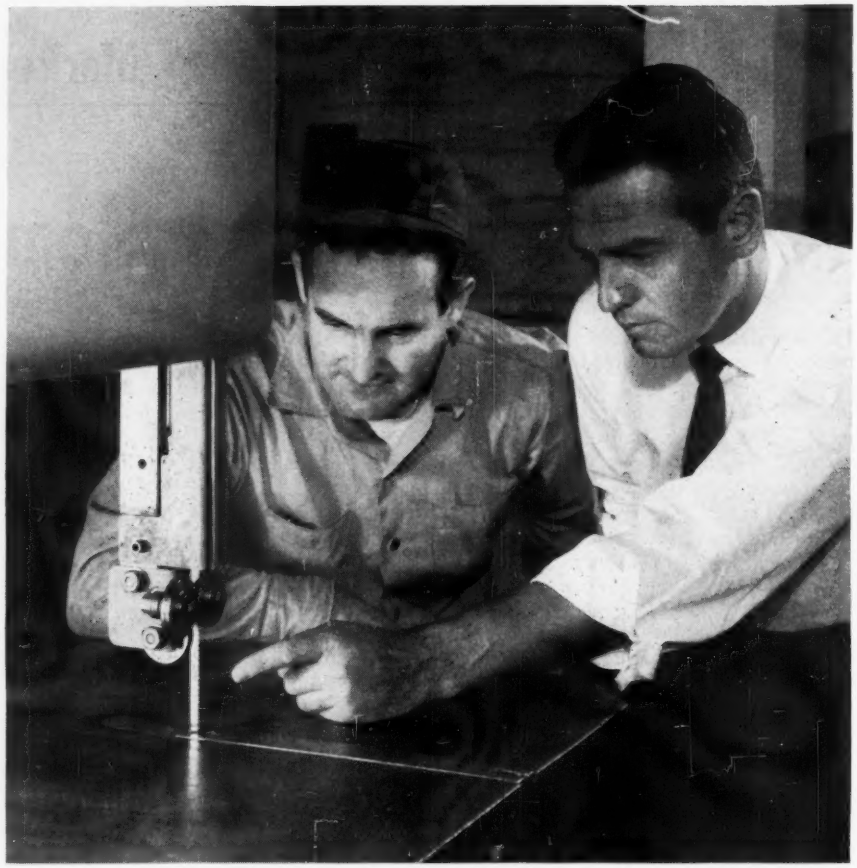

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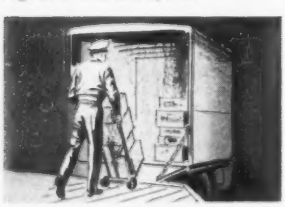

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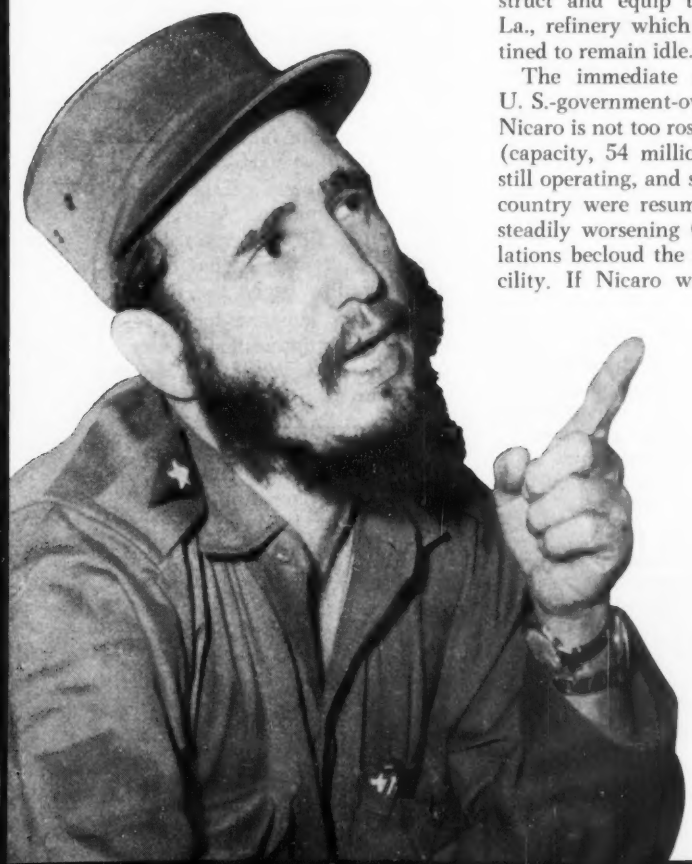
# Without Cuba—Still Enough Nickel

FREE WORLD NICKEL supplies are more than adequate for the foreseeable future despite Castro's antics.

• **Intervention**—The long awaited seizure of Moa Bay Mining Co. (nickel-cobalt mining and processing facilities in Cuba owned by Freeport Sulphur Co.) took place in mid-August. Loss of the $61.5 million facility (another $13.5 million was to have been spent there) removes 50 million lb of nickel a year from the Free World market. Another $44 million went to construct and equip the Port Nickel, La., refinery which now seems destined to remain idle.

The immediate outlook for the U. S.-government-owned complex at Nicaro is not too rosy. Nicaro's plant (capacity, 54 million lb a year) is still operating, and shipments to this country were resumed in July. But steadily worsening Cuban-U. S. relations becloud the future of the facility. If Nicaro were seized, both it and Freeport could wind up in the hands of the Reds. The Communist bloc is nickel short, and rumor has it that Cuba is anxious to make a nickel trade deal with the Commies.



**Free World Capacity Rises**

(In millions of lb)

| | |
|---|---|
| 1951 | 286.0 |
| 1953 | 335.2 |
| 1955 | 438.3 |
| 1957 | 489.0 |
| 1959 | 547.0 |
| 1961 | 649.0 |

Figures include Nicaro but not Moa Bay capacity.

• **Plenty of Nickel**—The loss of Cuban nickel would be reflected in the supply situation, but there would still be plenty of metal around. Here's why: International Nickel Co. of Canada Ltd. will begin production at its new Thompson, Manitoba, facility early in 1961 and will be at capacity operations (75 million lb annually) by midyear. Recent expansions by other Canadian producers and in New Cale-

donia have raised Free World capacity by 24.5 million lb annually. Result: Not counting Cuba, Free World capacity next year will be 649 million lb, 42 per cent more than Free World consumption in 1959.

Two other factors help to brighten the short term outlook. First, the U. S. government holds 100 million lb of metal in the Defense Production Act inventory which could be released to consumers if the need arose. Second, stocks of Nicaro nickel oxide sinter in this country have been swelled by the recent arrival of 15 million lb. They now stand at over 30 million lb, enough to satisfy demand for more than a year. By that time, observers hope, the situation will be resolved one way or the other.

Other producers also have pretty healthy inventories of unsold nickel.

• **More Expansion Ahead** — The long term outlook is less certain but not discouraging. Producers don't want users to design away from nickel because of tight supply—as was the case from the early forties to the late fifties. Says Albert P. Gagnebin, Inco vice president of sales: "Our aim is to continually expand markets for nickel and to provide the production to meet the demands of these markets."

Inco's Thompson complex may be expanded beyond its present rated capacity within the next few years.

Another possibility is that the M. A. Hanna Co. will produce nickel for the civilian market when its contract with the government expires. Since 1955, Hanna has been operating a ferronickel operation at Riddle, Oreg., for government account. The contract will expire when Hanna has delivered 125 million lb of ferronickel to the stockpile (75 million lb had been delivered at the start of 1960) or in June, 1962, whichever is earlier.

Reports indicate some pressure is building up to get Hanna's current production diverted to commercial users. The firm produces about 21 million lb of ferronickel a year.

• **U. S. Would Miss Sinter**—Many makers of stainless steel use the 90 per cent sinter, mainly because it sells for 69.60 cents a pound. The electrolytic nickel quotation is 74 cents a pound. Since Inco produces only a small quantity of sinter, loss of Nicaro would mean some nickel users would have to pay about 4.5 cents a pound more for their metal.

• **Good Year for Nickel**—After getting off to a fast start in 1960, U. S. nickel sales tapered off, particularly those to steelmakers. As one nickel man puts it: "We expected some sloughing off in steel, but this has been more like a toboggan ride."

In Europe, demand for nickel is even ahead of optimistic forecasts.

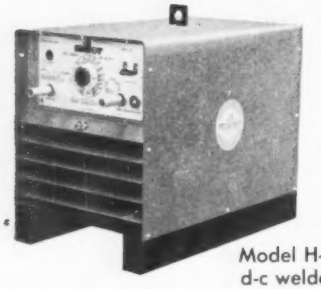
Look for Free World consumption to hit an all-time high of around 500 million lb this year vs. 420 million last year, the record. On the basis of forecasting a moderate upswing in the fourth quarter, producers look for 1960 consumption in the U. S. to match or even edge above last year's record of 227 million lb.

The industry's projection for next year: A 5 to 10 per cent gain in Free World consumption.

• **Where Nickel Will Go**—In 1959,


two new compacts from miller

Model M-295
a-c welder


Model H-3-SR
d-c welder

**Wide range Miller M-295 a-c welder packs a lot of versatility in its compact 25″ x 19″ x 28″ case. What's more, it's a genuinely low-cost 40 volt 200 ampere industrial welder that doesn't pretend to be all things to all men. Rather, it offers typical Miller sturdiness and reliability in a 60% duty cycle machine that's ideal for general maintenance and light production welding. Welding amperage ranges are 25-115 and 80-295. Power factor correction available as option.**

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**Complete information will be sent promptly upon request. Please specify model in which you're interested.**

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nickel consumption broke down this way: Stainless steels, 29 per cent; high nickel alloys, 16 per cent; electroplating, 15 per cent; nickel alloy steels, 15 per cent; foundry products, 12 per cent; copper-nickel alloys, 4 per cent; and all others, 9 per cent. The outlook: Those markets will expand through new uses and growth in old ones. There'll be little change in the historical percentage relationships.

Sherritt Gordon Mines Ltd. foresees a healthy growth for nickel powders, says Gordon McKay, treasurer.

Inco is working hard on a 9 per cent nickel steel for cryogenic uses, says Mr. Gagnebin. "We believe there's a potential here for more than 1 million lb of nickel a year."

Projects underway at Inco: A new coating for carbon steel, corrosion protection of auto body sheets, new uses for construction alloy steels, antismog devices, and marine applications.

The nickel-cadmium battery could turn into a multimillion pound a year market for nickel, believes Mr. Gagnebin, although present uses are limited by the unit's cost. Good prospects for big markets: Heavy duty trucks and certain industrial applications.

• **Electroplating Up** — The return of electroplating as a volume market is a bullish feature. "A lot of duplex plating (two coats of nickel) is being used," says Mr. Gagnebin, "which has to a large extent restored confidence in plating."

Inco is out to increase industrial markets for plating. It's one reason why the company recently appointed Metal & Thermit Corp. as a distributor of its anode products.

• **Prices Stable**—Nickel prices won't move over the remainder of 1960. Outlook for 1961: Continued stability.

## Distributors . . .

Prices, Page 189

Steel service centers look for some improvement this month, now that consuming plants have completed shutdowns for mass vacations.

Although stocks in the hands of distributors are heavy (especially in plates, structural shapes, and bars) service centers are buying a little more from mills to replace outgoing tonnages. No disposition is being shown to bolster stocks at this time. With mills able to make fast deliveries, steel service centers will continue to buy material only as it is needed.

Prices quoted on imported material in the Southwest are unchanged, completing four months of stability. This is the longest such period in two years and indicates a close balance between supply and demand.

## Tin Plate . . .

Tin Plate Prices, Page 186

U. S. Steel's new thinner tin plate (Ferrolite), which was in the pilot stage only last January, has been made commercially available in weights of 45 through 60 lb per base box. The price of the new product, which is about half the thickness of tin plate now used in making cans, ranges from $6.10 to $6.65 per base box at U. S. Steel's mills at Pittsburgh, Fairless, Pa., Gary, Ind., and Fairfield, Ala.

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Leslie B. Worthington, president, U. S. Steel, says substantial quantities of 6-ounce cans made of the lighter tin plate have been used successfully in packaging frozen concentrates. Similar results have been realized in packaging motor oil in quart cans.

Canmakers say they don't know what their costs will be because they haven't had time to appraise the effect of the prices of the new tin plate, or to complete tests on existing equipment.

So far, experimenting has been confined to test runs — including cans for the important fruit and vegetable packs.

## Sheets, Strip . . .

Sheet & Strip Prices, Pages 185 & 186

Sheet consumption continues to run ahead of mill shipments, but while buyers are still drawing on their inventories, new orders are gradually improving. Generally, the sheetmakers are counting on a surge in ordering no later than next month —they had expected September buying to be up appreciably from the preceding month, but, so far, volume has been disappointing.

It is apparent that the upturn in steel buying, when it really gets going, will be sparked by increased demands from the automakers. The motor car builders are specifying heavier shipments of steel for October, but they are showing considerable restraint in placing new orders.

It's apparent that the feverish push which usually accompanies the introduction of new models is lacking this year.

Cold rolled sheets are once again assuming the lead position in steel demand. They are available for three to four weeks delivery, while hot rolled sheets can be had in two to three weeks. Specialties, such as electrical sheets and enameling stock, can be had within three to four weeks. Galvanized sheet deliveries extend five weeks or more.

August bookings of a major flat rolled steel producer in the Pittsburgh area were slightly better than they were in the preceding month. Some automotive tonnage originally scheduled for late August delivery is going out now, so September will almost certainly bring an upturn in shipments, it's thought. In general, sheet sales executives are cautiously optimistic because cutbacks have stopped, and automotive buying for October is up.

Air conditioning needs are holding up well, despite the passing of the summer. This accounts, in part, for delivery promises of five weeks and more on galvanized sheets, which are the most extended of all grades of sheets.

Heavier fourth quarter shipments of carbon and specialty sheets will include a substantial volume of deferred third quarter tonnage. In New England, it's said that at least half the increase in shipments, starting October, will be made up of orders originally placed for delivery during the third quarter. Bookings for the last three months of the year will be for production, not inventory.

## Stainless Steel . . .

Stainless Steel Prices, Page 188

Price shading on stainless sheets, bars, and other products at both mill and warehouse levels is reported in New England. Not all mills or distributors are following the reductions on the higher priced grades, including 316, but the general trend puts in question any talk of a price advance in December. No one admits price cutting in stainless, but all say two important sellers figure prominently in the downward ac-

## Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

| | North Atlantic | Great Lakes | South Atlantic | Gulf Coast | West Coast |
|---|---|---|---|---|---|
| Deformed Bars, Intermediate, ASTM-A 305 | $5.65 | $5.55 | $5.55 | $5.40 | $5.75 |
| Bar Size Angles | 5.85 | 5.75 | 5.75 | 5.60 | 5.95 |
| Structural Angles | 5.65 | 5.55 | 5.55 | 5.40 | 5.75 |
| I-Beams | 5.60 | 5.50 | 5.50 | 5.35 | 5.70 |
| Channels | 5.60 | 5.50 | 5.50 | 5.35 | 5.70 |
| Plates (basic bessemer) | 5.85 | 5.75 | 5.75 | 5.60 | 5.95 |
| Sheets, H.R. | Nom. | Nom. | Nom. | Nom. | Nom. |
| Sheets, Galvanized, 20 Ga., 36 in. x 96 in. | Nom. | Nom. | Nom. | Nom. | Nom. |
| Sheets, Galv. (in coils) 20 Ga., 48 in. wide | Nom. | Nom. | Nom. | Nom. | Nom. |
| Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft | 25.70 | 25.14 | 24.85 | 24.85 | 26.02 |
| Barbed Wire (†) | 6.15 | 6.05 | 6.05 | 5.90 | 6.25 |
| Merchant Bars | 5.85 | 5.75 | 5.75 | 5.60 | 5.95 |
| Hot-Rolled Bands | 6.20 | 6.10 | 6.10 | 5.95 | 6.30 |
| Wire Rods, Thomas Commercial No. 5 | 6.40 | 6.35 | 6.20 | 6.20 | 6.60 |
| Wire Rods, O. H., No. 5 | 6.55 | 6.50 | 6.35 | 6.35 | 6.70 |
| Bright Common Wire Nails (‡) | 7.30 | 7.20 | 7.20 | 7.05 | 7.40 |

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

tion. September shipments of stainless steel are reported nearly 10 per cent above those the previous month.

## Wire . . .

Wire Prices, Pages 186 & 187

Heavier bookings of steel wire orders are still lacking. Spot orders for prompt shipment are slightly increased, and some consumers are beginning to anticipate their forward requirements. With mill lead-time reduced, however, the buying pace is likely to continue sluggish the rest of the year. Inventories have been worked off at slower rate than had been expected.

Some fourth quarter orders for the automotive industry are coming through, but fastener manufacturers are not doing much buying. Consumers, generally, are holding mills to delivery promises, more volume being placed on the basis of shipment.

## Steel Bars . . .

Bar Prices, Page 184

Inventories of steel bars at consumers' plants are being worked down to a reasonable level in most cases. However, there is little disposition on the part of buyers to rebuild stocks, especially since they can still obtain shipments from the mills within two to four weeks.

Fastener manufacturers report an improvement in automotive demand but say that agricultural equipment requirements continue poor. New England shops that recently booked armament and small arms orders have yet to place bar orders for the bulk of the $11 million of contracts. Part of the bars will be die rolled.

The bulk of the business is held by three shops, in Worcester, Mass., New Haven, Conn., and Biddeford, Maine.

Producers of cold finished bars still report dull business. Deliveries are available out of stock on most specifications. As consumers liquidate their inventories and try to get along on minimum stocks, they're demanding faster service than ever before. Case in point: One cold finisher lost a 50,000 lb order recently because his promise to ship within a week wasn't good enough.

Cold finishers are operating at about 50 per cent of capacity. August bookings for some were 5 per cent better than in the previous month, but the total fell far below expectations. Sales executives anticipated a pickup in automotive demand after Aug. 15, but it didn't materialize.

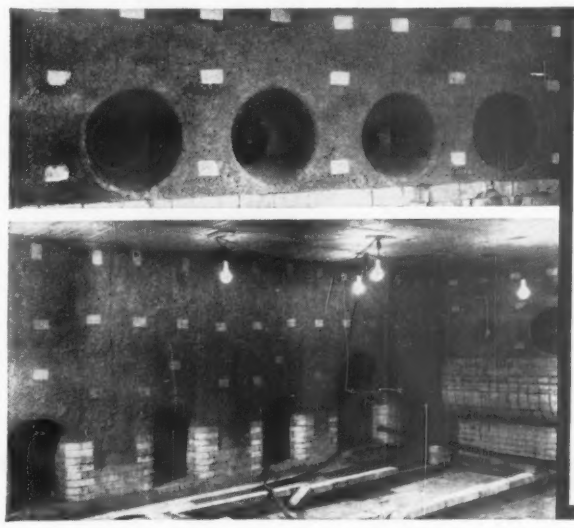
Orders are coming in to the cold finishers so slowly they can't tell what they'll be doing from one week to the next. At one Pittsburgh area plant, operations are currently on a one shift, five day basis, but a four day week is being contemplated. Customers are ordering such small quantities one firm recently had to run 11 different sizes on one piece of equipment in one day—four of the 8 hours were downtime.

## Plates . . .

Plate Prices, Page 184

Platemakers report demand continues slow, though one mill says current buying for the fourth quarter is at least running ahead of the pace of forward buying in early June.

Fourth quarter demand is fairly

**PLIBRICO "Super" and PLIBRICO "Super F" plastics** form a continuous, fully-anchored monolithic lining for the side walls and burner walls, with smooth contours around the door arches and burner cones, in this Salem-Brosius slab reheating furnace.

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|---|---|---|---|
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| CHICAGO | HARTFORD | NEW YORK | SYRACUSE |
| CLEVELAND | INDIANAPOLIS | PHILADELPHIA | WASHINGTON, D. C. |
| DAYTON | LOS ANGELES | PITTSBURGH | WORCESTER |

diversified. But there is an absence of important buying for carbuilding, pipeline, and oil storage tank requirements. Some Midwestern makers report their orders on line pipe account will soon be completed; one mill indicated its commitments will be cleaned up by mid-September, with no new large jobs in sight.

Some carbuilders still have fair order backlogs and are buying plates and shapes. Some buying of special types of cars is expected this fall. Naval shipyard buying, which has been slow, will pick up soon.

A revised list of extras on carbon steel plates, dated Aug. 29, has been issued by Inland Steel Co., Chicago. It incorporates a number of minor changes, including modification of the structural list to provide for the new ASTM A-36-60T grade —it was recently adopted as a new specification covering carbon shapes, plates, and bars, for use in welded, riveted, or bolted construction of bridges and buildings and for general construction.

## Tubular Goods . . .

Tubular Goods Prices, Page 188

Demand for oil country goods is improving as distributors and consumers deplete surplus stocks. August bookings were better than those the previous two months and slightly better than May's. Users are showing interest in some heavier items, such as 5½ and 7 in. casing. They have been taking the popular sizes of tubing (2⅜ to 2⅞ in.) and 4½ in. casing the last month or so.

Since most of the tonnage moving is on a quick delivery basis, it's impossible to forecast September shipments, but there has been a 5 per cent improvement in advance buying of specialty items.

The major oil companies are getting the bulk of their pipe from distributors and mill inventories. Approval by the Federal Power Commission of several big natural gas transmission projects has been a shot in the arm to producers of 24 and 30 in. diameter pipe.

Railroad labor trouble at the Lorain Works, National Tube Div., U. S. Steel Corp. at Lorain, Ohio, may force a cut in operations.

The latest weekly survey by Hughes Tool Co. shows that 1828 rotary oil drilling rigs were operating in the U. S. and Canada.

## Structural Shapes . . .

Structural Shape Prices, Page 184

Structural steel orders totaled 270,198 net tons in July, up slightly from those placed the preceding month, when bookings amounted to 267,910 tons, and up 4 per cent from the 259,131 tons placed in July, 1959, reports the American Institute of Steel Construction.

Bookings in the first seven months of this year were 2,005,899 tons, an increase of 7 per cent (approximately 135,000 tons) over bookings in the like period of 1959.

Shipments in July were the second best monthly total this year, amounting to 301,249 tons, and exceeded only by the 323,694 tons moved in June. Compared with a year ago (during the steel strike), shipments were up 26 per cent. In the first seven months this year, 1,932,264 tons were moved, 2 per cent more than in the like 1959 period.

Order backlogs as of July 31 totaled 2,203,253 tons. Of that total, 1,257,676 tons (57 per cent) are scheduled for fabrication in the four months ending Nov. 30.

Restrictions on the use of prestressed concrete in Chicago, in effect since last June, have been lifted. The Pre-Stressed Concrete Institute submitted some 400 pages of test data which a special committee studied with City Building Commissioner George L. Ramsey.

Prestressed, precast concrete now will be permitted in Chicago construction if it meets the city's building code. The ruling will allow designing professions to use it for reasonably fire safe and structural safe buildings. However, Mr. Ramsey warned that under certain circumstances, fire damage could occur with this type construction. In the new order, prestressed steel wire cables must be covered by a minimum of 1 to 2 in. of concrete.

Inquiry for structurals is off, but with the vacation season over, builders should more actively advance current projects. Some fabricators are expecting an uptrend into early November.

Legislative and legal tangles are being clarified for $200 million of commercial buildings in Boston, the


*This advertisement is neither an offer to sell nor a solicitation of offers to buy any of these securities. The offering is made only by the Prospectus.*

NEW ISSUE

August 31, 1960

$125,000,000

Republic Steel Corporation

4⅜% Sinking Fund Debentures Due 1985

Dated September 1, 1960 Due September 1, 1985

Price 99% and accrued interest

*Copies of the Prospectus may be obtained from any of the several underwriters, including the undersigned, only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may legally be distributed.*

The First Boston Corporation — Merrill Lynch, Pierce, Fenner & Smith Incorporated

Kuhn, Loeb & Co. — Goldman, Sachs & Co. — Eastman Dillon, Union Securities & Co.

Lehman Brothers — Harriman Ripley & Co. Incorporated — Kidder, Peabody & Co.

Lazard Frères & Co. — Smith, Barney & Co. Incorporated — Stone & Webster Securities Corporation

White, Weld & Co. — Dean Witter & Co.

Scollay Square Government Center and Prudential Group. Work has stopped on the main Prudential tower and the area is piled high with fabricated structural steel. Prudential wants a long term, guaranteed tax agreement.

The American Society for Testing Materials recently adopted a new structural steel specification known as ASTM A-36-60T. It covers carbon shapes, plates, and bars for use in welded, riveted, or bolted construction. It's said to offer structural users a higher strength steel which will be more competitive with prestressed concrete.

Inland Steel Co. last week revised its extras on shapes, plates, and bars, incorporating a number of minor changes and modifying the structural list to allow for the new ASTM specification.

## Iron Ore . . .

Iron Ore Prices, Page 199

Iron ore stocks continue to rise. Total inventory (U. S. and Canada) at the end of July was 63,644,088 gross tons, reports the American Iron Ore Association. That compares with 56,004,624 at the end of July, 1959. Of the total, 61,217,816 tons were held in the U. S. Lake Superior ore stocks amounted to 34,178,478 tons vs. 33,935,342 a year ago.

Consumption of ore during the month (U. S. and Canada) at 7,513,324 tons was down from the 8,551,360 used in June but was up from the 6,171,854 tons used in July, 1959, during which month the steel strike started. Consumption in the U. S. in July was 7,014,496 tons vs. 8,059,541 in June.

Out of a total of 273 blast furnaces in the U. S. and Canada, only 150 were operating at the start of August (12 in Canada and 138 in the U. S.). That compares with 162 active stacks (11 in Canada and 151 in the U. S.) at the end of June.

Despite the sluggish steelmaking and blast furnace operations since last May, total consumption of iron ore in the first seven months of this year was off only 785,359 tons from the like period of 1959, totaling 74,154,895 tons vs. 74,940,254.

## STRUCTURAL SHAPES . . .

### STRUCTURAL STEEL PLACED

4700 tons, Brownsville State Bridge, Washington-Fayette counties, Pennsylvania, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

1000 tons, including reinforcing bars, Patapsco Avenue bridge and causeway, Baltimore, to Marko Engineering Co., Baltimore (structurals) and Bethlehem Steel Co., Bethlehem, Pa. (reinforcing bars); McLean Contracting Co., Baltimore, general contractor.

850 tons, six state highway structures, Littleton-Westford, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; Bayer & Mingolla Construction Co. Inc., Worcester, Mass., general contractor.

800 tons, four state bridges, Attleboro-North Attleboro, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; M. A. Gammino Construction Co., Providence, R. I., general contractor.

750 tons, state highway bridges, Salem, N. H., to Phoenix Bridge Co., Phoenixville, Pa.; M. DeMatteo Construction Co., Quincy, Mass., general contractor.

430 tons, also unstated tonnage of wire, etc., and 200 tons of reinforcing bars, repairs to damaged Washington State Hood Canal floating bridge, to Yuba Consolidated Industries Inc., Emeryville, Calif., general contract, at $3,445,000.

354 tons, West Coast Telephone Co. plant, Everett, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle; John H. Sellen Construction Co., Seattle, general contractor.

275 tons, two state bridges, Manchester, N. H., to Lyons Iron Works, Manchester; The Palazzi Corp., Johnston, R. I., general contractor.

200 tons, plant, St. Regis Paper Co., West Nyack, N. Y., through Wigton-Abbott Co., Plainfield, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

## REINFORCING BARS . . .

### REINFORCING BARS PLACED

1620 tons, Capital Hill section, Seattle Freeway, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Puget Sound Bridge & Drydock Co., Seattle, general contractor.

475 tons, addition to Washington State Hospital, Sedro-Woolley, to Soule Steel Co., Seattle; Nelson Construction Co., general contractor.

257 tons, All-State Insurance Co., office, Seattle, to Pacific Coast Div., Bethlehem Steel Co., Seattle; John H. Sellen Construction Co., Seattle, general contractor.

### REINFORCING BARS PENDING

1400 tons, Beaver dam and appurtenant works, White River, Arkansas; bids Nov. 3, U. S. Engineer, Little Rock, Ark.

513 tons, spillway, Navarro Mills Reservoir, Richland Creek, Tex.; bids Sept. 20, to the U. S. Engineer, Ft. Worth, Tex.

200 tons, repairs to Washington State, Hood Canal floating bridge; general contract placed.

## PLATES . . .

### PLATES PENDING

787 tons, high tensile, Naval shipyard, Philadelphia.

700 tons, structurals, wall panels and roof deck, Hoerner Boxes Inc., Gurnee, Ill., to Wendnagel & Co., Chicago (structurals) and Inland Steel Products Co., Milwaukee (wall panels and roof deck).

575 tons, three tanks, Foss Aqueduct, Washita Basin project, Bureau of Reclamation, near Clinton, Okla.; bids Sept. 27.

350 tons, Federal building, Parkersburg, W. Va., to Mountain States Fabricating Co., Clarksburg, W. Va.; Blount Bros. Construction Co., Montgomery, Ala., general contractor; reinforcing bars to H. K. Porter Company Inc., Connors Steel Div., Huntington, W. Va. (450 tons).

260 tons, research center, American Brass Co., Waterbury, Conn., to Berlin Construction Co., Berlin, Conn.; W. J. Megin Inc., Naugatuck, Conn., general contractor; concrete reinforcing bars to U. S. Steel Supply Div., U. S. Steel Corp., New York.

## RAILS, CARS . . .

### RAILROAD CARS PLACED

New York City Transit Authority, 260 subway cars to the St. Louis Car Co., St. Louis.

### RAILROAD CARS PENDING

Argentine State Railways, 3000 various types of freight cars, 300 passenger cars, and 10 wrecking trains; also, 110 locomotives and 192 cranes. Bureau of Foreign & Domestic Commerce, U. S. Department of Commerce, Washington, has the details.

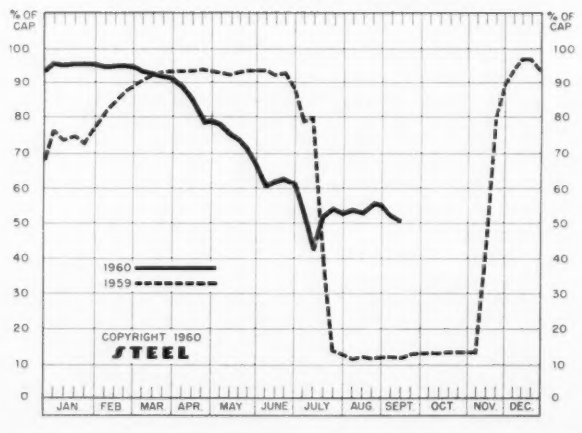
## DISTRICT INGOT RATES

(Percentage of capacity utilized)

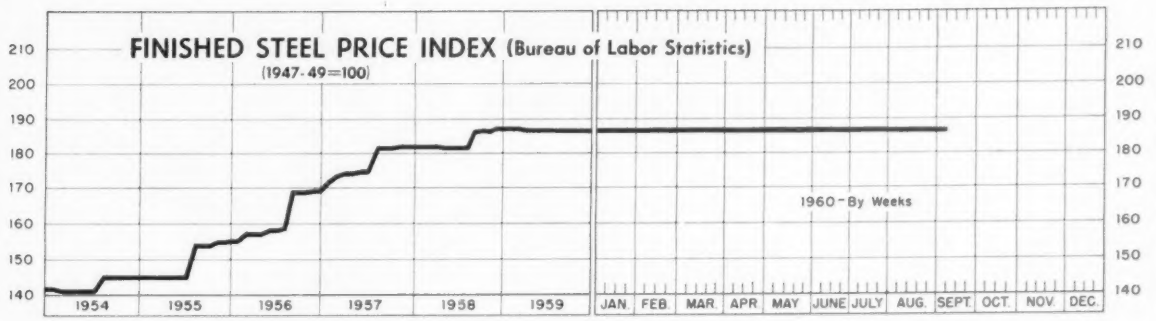
| | Week Ended Sept. 11 | Week Ago | Month Ago | Year Ago |
|---|---|---|---|---|
| Northeastern | 53 | 54 | 59 | * |
| Buffalo | 56 | 56 | 57 | * |
| Pittsburgh | 42 | 44 | 46 | * |
| Youngstown | 36 | 41 | 47 | * |
| Cleveland | 46 | 53 | 49 | * |
| Detroit | 73 | 72 | 81 | * |
| Chicago | 58 | 58 | 57 | * |
| Cincinnati | 52 | 56 | 54 | * |
| St. Louis | 64 | 63 | 55 | * |
| Southern | 56 | 59 | 55 | * |
| Western | 53 | 48 | 47 | * |
| Total Industry | 50.6 | 52.0 | 53.5 | 11.5 |
| Index (1947-49=100) | 89.7 | 92.3 | 94.9 | 20.4 |
| Net Tons (In thousands) | 1,441 | 1,483 | 1,525 | 327 |

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute. *Not available due to general strike.

## NATIONAL STEELWORKS OPERATIONS



# Price Indexes and Composites




| Sept. 6, 1960 | Week Ago | Month Ago | Aug. Index | Year Ago |
|---|---|---|---|---|
| 182.2 | 186.2 | 186.2 | 186.2 | 186.7 |

## AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

**Week Ended Sept. 6**

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

| | | | |
|---|---|---|---|
| Rails, Standard No. 1 | $5.825 | Bars, H.R., Carbon | 6.675 |
| Rails, Light, 40 lb | 7.292 | Bars, Reinforcing | 6.335 |
| Tie Plates | 6.875 | Bars, C.F., Carbon | 10.710 |
| Axles, Railway | 10.175 | Bars, C.F., Alloy | 14.125 |
| Wheels, Freight Car, 33 in. (per wheel) | 62.000 | Bars, C.F., Stainless, 302 (lb) | 0.570 |
| Plates, Carbon | 6.350 | Sheets, H.R., Carbon | 6.350 |
| Structural Shapes | 6.167 | Sheets, C.R., Carbon | 7.300 |
| Bars, Tool Steel, Carbon (lb) | 0.560 | Sheets, Galvanized | 8.775 |
| Bars, Tool Steel, Alloy, Oil Hardening Die (lb) | 0.680 | Sheets, C.R., Stainless, 302 (lb) | 0.658 |
| Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb) | 1.400 | Sheets, Electrical | 12.625 |
| Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb) | 1.895 | Strip, C.R., Carbon | 9.489 |
| Bars, H.R., Alloy | 10.775 | Strip, C.R., Stainless, 430 (lb) | 0.480 |
| Bars, H.R., Stainless, 303 (lb) | 0.543 | Strip, H.R., Carbon | 6.250 |
| | | Pipe, Black, Buttweld (100 ft) | 19.495 |
| | | Pipe, Galv., Buttweld (100 ft) | 23.098 |
| | | Pipe, Line (100 ft) | 195.430 |
| | | Casing, Oil Well, Carbon (100 ft) | 201.080 |
| | | Casing, Oil Well, Alloy (100 ft) | 315.213 |
| | | Tubes, Boiler (100 ft) | 51.200 |
| | | Tubing, Mechanical, Carbon (100 ft) | 27.005 |
| | | Tubing, Mechanical, Stainless, 304 (100 ft) | 195.395 |
| | | Tin plate, Hot-dipped, 1.25 lb (95 lb base box) | 10.100 |
| | | Tin Plate, Electrolytic, 0.25 lb (95 lb base box) | 8.800 |
| | | Black Plate, Canmaking Quality (95 lb base box) | 7.900 |
| | | Wire, Drawn, Carbon | 10.575 |
| | | Wire, Drawn, Stainless, 430 (lb) | 0.665 |
| | | Bale Ties (bundles) | 7.647 |
| | | Nails, Wire, 8d Common | 9.433 |
| | | Wire, Barbed (80-rod spool) | 8.414 |
| | | Woven Wire Fence (20-rod roll) | 21.003 |

## STEEL's FINISHED STEEL PRICE INDEX

| | Sept. 7 1960 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Index (1935-39 avg=100) | 247.82 | 247.82 | 247.82 | 247.82 | 207.63 |
| Index in cents per lb | 6.713 | 6.713 | 6.713 | 6.713 | 5.625 |

## STEEL's ARITHMETICAL PRICE COMPOSITES

| | | | | | |
|---|---|---|---|---|---|
| Finished Steel, NT | $149.96 | $149.96 | $149.96 | $149.96 | $127.41 |
| No. 2 Fdry, Pig Iron, GT | 66.49 | 66.49 | 66.49 | 66.49 | 58.99 |
| Basic Pig Iron, GT | 65.99 | 65.99 | 65.99 | 65.99 | 58.49 |
| Malleable Pig Iron, GT | 67.27 | 67.27 | 67.27 | 67.27 | 59.77 |
| Steelmaking Scrap, GT | 32.33 | 32.67 | 32.00 | 40.00 | 44.00 |

# Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

| FINISHED STEEL | Sept. 7 1960 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Bars, H.R., Pittsburgh | 5.675 | 5.675 | 5.675 | 5.675 | 4.65 |
| Bars, H.R., Chicago | 5.675 | 5.675 | 5.675 | 5.675 | 4.65 |
| Bars, H.R., deld., Philadelphia | 5.975 | 5.975 | 5.975 | 5.975 | 4.90 |
| Bars, C.R., Pittsburgh | 7.65* | 7.65* | 7.65* | 7.65* | 5.90 |
| Shapes, Std., Pittsburgh | 5.50 | 5.50 | 5.50 | 5.50 | 4.60 |
| Shapes, Std., Chicago | 5.50 | 5.50 | 5.50 | 5.50 | 4.60 |
| Shapes, deld., Philadelphia | 5.77 | 5.77 | 5.77 | 5.77 | 4.88 |
| Plates, Pittsburgh | 5.30 | 5.30 | 5.30 | 5.30 | 4.50 |
| Plates, Chicago | 5.30 | 5.30 | 5.30 | 5.30 | 4.50 |
| Plates, Coatesville, Pa. | 5.30 | 5.30 | 5.30 | 5.30 | 4.50 |
| Plates, Sparrows Point, Md. | 5.30 | 5.30 | 5.30 | 5.30 | 4.50 |
| Plates, Claymont, Del. | 5.30 | 5.30 | 5.30 | 5.30 | 4.50 |
| Sheets, H.R., Pittsburgh | 5.10 | 5.10 | 5.10 | 5.10 | 4.325 |
| Sheets, H.R., Chicago | 5.10 | 5.10 | 5.10 | 5.10 | 4.325 |
| Sheets, C.R., Pittsburgh | 6.275 | 6.275 | 6.275 | 6.275 | 5.325 |
| Sheets, C.R., Chicago | 6.275 | 6.275 | 6.275 | 6.275 | 5.325 |
| Sheets, C.R., Detroit | 6.275 | 6.275 | 6.275 | 6.275 | 5.325-5.425 |
| Sheets, Galv., Pittsburgh | 6.875 | 6.875 | 6.875 | 6.875 | 5.85 |
| Strip, H.R., Pittsburgh | 5.10 | 5.10 | 5.10 | 5.10 | 4.325 |
| Strip, H.R., Chicago | 5.10 | 5.10 | 5.10 | 5.10 | 4.325 |
| Strip, C.R., Pittsburgh | 7.425 | 7.425 | 7.425 | 7.425 | 6.25-6.45 |
| Strip, C.R., Chicago | 7.425 | 7.425 | 7.425 | 7.425 | 6.35-6.45 |
| Strip, C.R., Detroit | 7.425 | 7.425 | 7.425 | 7.425 | 6.35 |
| Wire, Basic, Pittsburgh | 8.00 | 8.00 | 8.00 | 8.00 | 6.25 |
| Nails, Wire, nonstock, Pitts. | 8.95 | 8.95 | 8.95 | 8.95 | 7.60 |
| Tin Plate (1.50 lb) box, Pitts. | $10.65 | $10.65 | $10.65 | $10.65 | $9.05 |

*Including 0.35c for special quality.

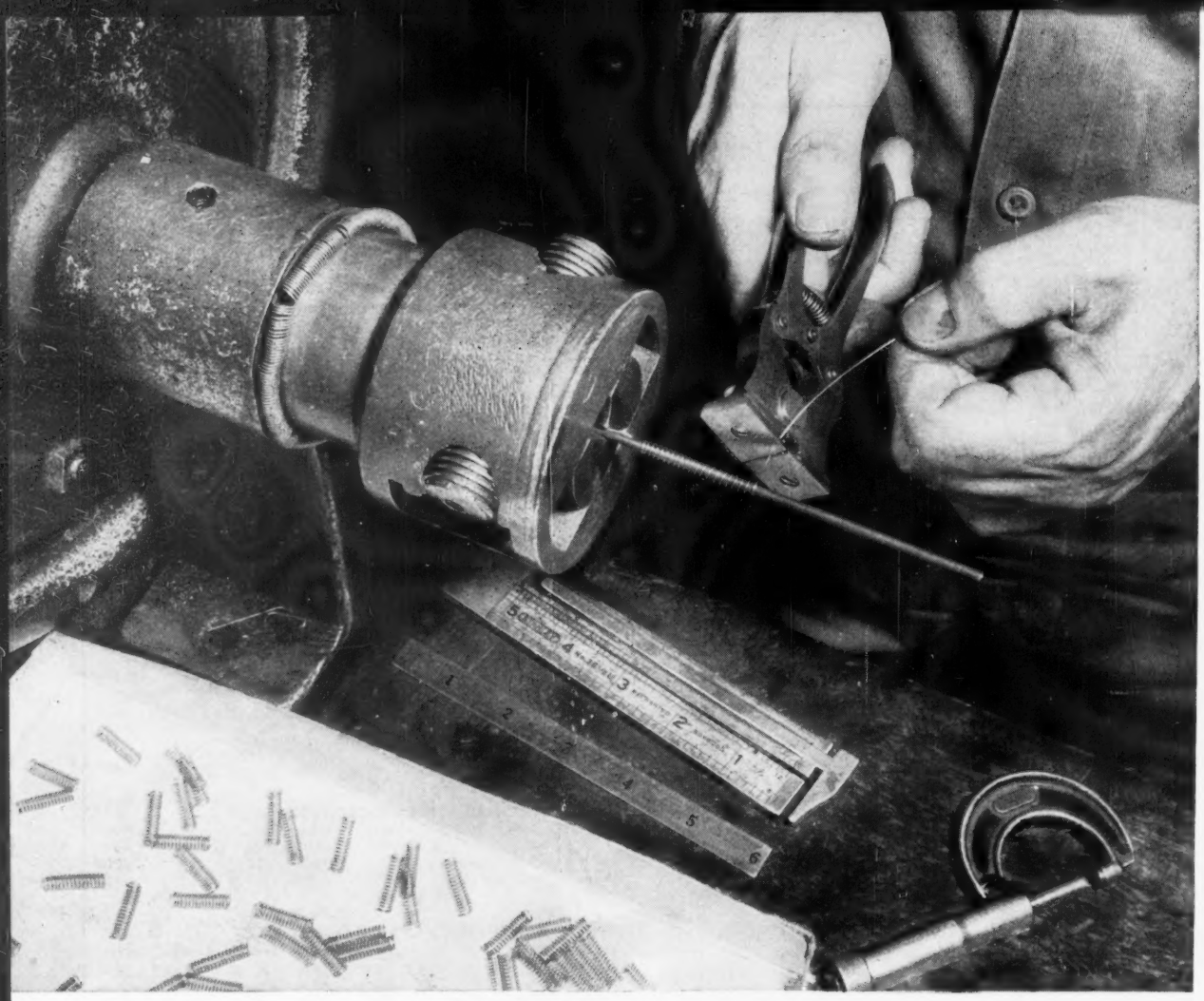
| SEMIFINISHED STEEL | | | | | |
|---|---|---|---|---|---|
| Billets, forging, Pitts. (NT) | $99.50 | $99.50 | $99.50 | $99.50 | $84.50 |
| Wire rods, 7/32-5/8" Pitts. | 6.40 | 6.40 | 6.40 | 6.40 | 5.025 |

| PIG IRON, Gross Ton | Sept. 7 1960 | Week Ago | Month Ago | Year Ago | 5 Yr Ago |
|---|---|---|---|---|---|
| Bessemer, Pittsburgh | $67.00 | $67.00 | $67.00 | $67.00 | $59.50 |
| Basic, Valley | 66.00 | 66.00 | 66.00 | 66.00 | 58.50 |
| Basic, deld., Philadelphia | 70.41 | 70.41 | 70.41 | 70.41 | 59.16 |
| No. 2 Fdry, NevilleIsland, Pa. | 66.50 | 66.50 | 66.50 | 66.50 | 59.00 |
| No. 2 Fdry, Chicago | 66.50 | 66.50 | 66.50 | 66.50 | 59.00 |
| No. 2 Fdry, deld., Phila. | 70.91 | 70.91 | 70.91 | 70.91 | 59.66 |
| No. 2 Fdry, Birmingham | 62.50 | 62.50 | 62.50 | 62.50 | 55.00 |
| No. 2 Fdry (Birm.), deld., Cin. | 70.20 | 70.20 | 70.20 | 70.20 | 62.70 |
| Malleable, Valley | 66.50 | 66.50 | 66.50 | 66.50 | 59.00 |
| Malleable, Chicago | 66.50 | 66.50 | 66.50 | 66.50 | 59.00 |
| Ferromanganese, net tonst. | 245.00 | 245.00 | 245.00 | 245.00 | 190.00 |

†74-76% Mn, Duquesne, Pa.

| SCRAP, Gross Ton (Including broker's commission) | | | | | |
|---|---|---|---|---|---|
| No. 1 Heavy Melt, Pittsburgh | $30.50 | $31.50 | $30.50 | $38.50 | $43.50 |
| No. 1 Heavy Melt, E. Pa. | 35.00 | 35.00 | 34.00 | 41.00 | 46.50 |
| No. 1 Heavy Melt, Chicago | 31.50 | 31.50 | 31.50 | 40.50 | 42.00 |
| No. 1 Heavy Melt, Valley | 33.50 | 33.50 | 33.50 | 41.50 | 46.50 |
| No. 1 Heavy Melt, Cleve. | 31.50 | 31.50 | 31.50 | 38.50 | 44.00 |
| No. 1 Heavy Melt, Buffalo | 29.50 | 29.50 | 29.50 | 33.50 | 39.50 |
| Rails, Rerolling, Chicago | 53.50 | 53.50 | 52.50 | 62.50 | 64.50 |
| No. 1 Cast, Chicago | 40.50 | 41.50 | 42.50 | 55.50 | 46.50 |

| COKE, Net Ton | | | | | |
|---|---|---|---|---|---|
| Beehive, Furn., Connlsvl. | $15.00 | $15.00 | $15.00 | $15.00 | $13.625 |
| Beehive, Fdry., Connlsvl. | 18.25 | 18.25 | 18.25 | 18.25 | 16.50 |
| Oven, Fdry., Milwaukee | 32.00 | 32.00 | 32.00 | 32.00 | 26.25 |



**Hand coiling of small spring orders is a skilled operation at The Yost Superior Co. in Springfield, Ohio. The company uses Johnson Music Spring Wire exclusively. Here, worker coils .012 wire into a compression spring with 16 coils having an O.D. of .196 inch. Small orders are filled overnight in this department.**

# Johnson Wire Speeds Overnight Delivery Of Handmade Springs

A spring maker who built a flourishing business by filling small orders practically overnight uses Johnson Steel & Wire Company's Music Spring Wire exclusively.

President L. V. Barnes of The Yost Superior Company, Springfield, Ohio, says flatly:

**"Johnson Music Spring Wire is best."** Since 1924, when a merger of Superior Spring Co. and Yost Gearless Motor Co. formed The Yost Superior Co., the firm has concentrated on producing custom-made springs and wire forms.

In one day recently, five telephoned orders for small lots of springs all specified the quickest possible delivery. "Three of those orders went out the same day and the other two were shipped the next morning," said William H. Craig, secretary-treasurer who heads production and purchasing activities.

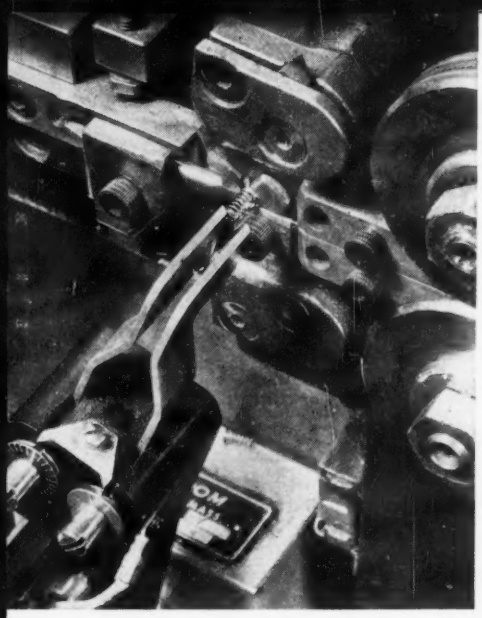
Three factors are all-important to Yost Superior. They are:

• **Spring Making Skill** — Yost Superior's bonus incentive plan, the long tenure of its employes and its steady growth for more than a half-century all demonstrate the company has a skilled work force which knows and practices the art of spring making.

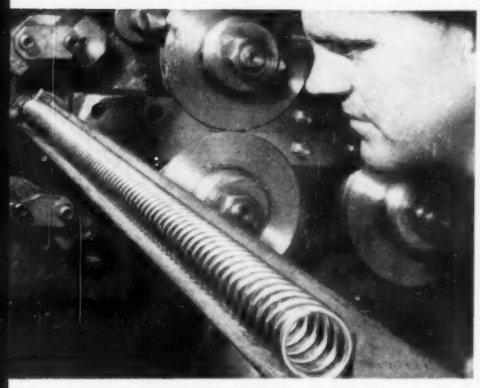
• **Sizable Inventory**—Large wire stocks, usually running around 500 tons, are always on hand in Yost Superior's stock room. Mr. Craig said: "Our customers depend on us to supply their needs quickly. That means large stocks of wire sizes commonly used." He added:

"Johnson Music Spring Wire is so good—consistently—that we feel confident in laying in a large supply. We don't worry about quality varying from coil to coil or shipment to shipment. We can depend on wire we buy today to match the properties and performance of wire we bought a year ago.

"When we order from Johnson,



**Electronic gager on this Torrington W10A Coiler measures to .005 inch in determining whether each spring coiled is the proper length. Springs rejected by the gager are blown to the side while good springs fall into container. Spring being coiled is made of .010 inch Johnson Music Spring Wire. It has an O.D. of .121 to .126 inch and is 5/16 inch long. It takes 1,000 springs to weigh a quarter pound.**



**Coiling a long spring on a Torrington W12A coiler from Johnson .120-inch diameter Music Spring Wire. The 95 coils in this spring measure 30-1/2 inches in length. Each coil has an O.D. of 1-1/16 inches.**

we get quick delivery from warehouses in Akron or Chicago."

• **Good Raw Materials** — President Barnes said: "We demand the utmost in uniformity of diameters, finishes, tempers and physical properties. We get it from Johnson Steel & Wire Co.

"We don't have to ask for service. It's given us without asking. And Johnson Music Spring Wire has worked well for us. I would say their wire is the best. One hundred percent testing of finished springs proves it.

**"We're accustomed to holding the diameter of springs — and often spring lengths — to tolerances stated in thousandth's, so we've got to have good wire. Johnson Music Spring Wire helps us meet specs and its performance helps us meet load requirements."**

While Yost Superior makes springs in large production runs for everything from grass seed spreaders to missiles and rockets, its Hand Department is a key operation.

In the Hand Department where orders for less than 100 springs or wire forms are filled, Johnson Music Spring Wire proves itself.

Coiling springs by hand means high labor costs so it's important to keep them down to a minimum or the cost of making a few springs would go sky high. Here cost of the wire is insignificant but quality of the wire is most important.

• **Quality Comes Through** — That's because there's little or no time for experimenting or trial runs The Hand Department pays off because the spring maker knows his business and uses Johnson Steel Wire with its predictable performance qualities.

Yost Superior uses the full range of Johnson Music Spring Wire from .008 inch diameter up to 250 inch to make all kinds of compression, extension and torsion springs as well as a bewildering array of wire forms

That's a good recommendation for any spring maker. Whatever your needs for Music Spring Wire or any other fine wire specialty, you can count on Johnson Steel & Wire Co to give you the same consistent quality and good service which pleases Yost Superior.

You can get better wire and better products, starting today. Just call the nearest district sales office, listed here, and talk to a Johnson man who knows wire and production problems.

**Grinding of spring ends on a Besly Grinder. These compression springs, made of .047 inch O.D. Johnson Music Spring Wire, are only 9/16 inch long and have an O.D. of 13/32 inch. On this machine, the closed ends are being ground square.**

**Coils of Johnson Music Spring Wire are delivered to the Coiling Department from Yost Superior's large stock room. The company normally carries an inventory of about 500 tons of wire.**


**Johnson Steel & Wire Company, Inc.**

Worcester 1, Massachusetts

***a subsidiary of* Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

| | | | | |
|---|---|---|---|---|
| Akron | Cleveland | Detroit | Los Angeles | Pittsburgh |
| Chicago | Dayton | Houston | New York | Tulsa |
| | | | Philadelphia | Warren, Ohio |

# Steel Prices

Mill prices as reported to STEEL, Sept. 7, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 185; footnotes, page 187.

## SEMIFINISHED

**INGOTS, Carbon, Forging (NT)**

Munhall,Pa. U5 .....$76.00

**INGOTS, Alloy (NT)**

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

**BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)**

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

**Carbon, Forging (NT)**

Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton Pa. U5 ....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99 50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 ....99.50

**Alloy, Forging (NT)**

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 ....119.00
Canton O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124 00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

**ROUNDS, SEAMLESS TUBE (NT)**

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

**SKELP**

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

**WIRE RODS**

AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ...7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....5.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6 50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

## STRUCTURALS

**Carbon Steel Std. Shapes**

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5 50
Geneva,Utah C11 .....5 50
Houston S5 .....5.60
Ind Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5 50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo C10 ....5 80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 ..5.50
S.SanFrancisco B3 ....6 15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

**Wide Flange**

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6 45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5 50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

**Alloy Std. Shapes**

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

**H.S., L.A., Std. Shapes**

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

**H.S., L.A., Wide Flange**

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

## PILING

**BEARING PILES**

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

**STEEL SHEET PILING**

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 .....6.50

## PLATES

**PLATES, Carbon Steel**

AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5 30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5 30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5 30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5 30
Minnequa,Colo. C10 ....6 15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5 30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5 30
S.Chicago Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5 30
Sterling,Ill. N15 .....5 30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

**PLATES, Carbon Abras. Resist.**

Claymont,Del. C22 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

**PLATES, Wrought Iron**

Economy,Pa. B14 .....14.10

**PLATES, H.S., L.A.**

Aliquippa Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy Pa. R14 .....7.05
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell Pa S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind Harbor Ind. I-2, Y1 7.05
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7 95
Pittsburgh J5 .....7 95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

**PLATES, Alloy**

Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 .....7.50
Coatesville Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 .....7 50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7 50
Newport,Pa. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7 50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint Md. B2 ..7.50
Youngstown Y1 .....7.50

**FLOOR PLATES**

Cleveland J5 .....6 375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6 375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

**PLATES, Ingot Iron**

Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 .6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

## BARS

**BARS, Hot-Rolled Carbon (Merchant Quality)**

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5 675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5 6 75
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

**BARS, Hot-Rolled Alloy**

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

**BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy**

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

**BAR SIZE ANGLES; H.R. Carbon**

Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

**BAR SIZE ANGLES; S. SHAPES**

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

**BAR SIZE ANGLES; S. SHAPES Wrought Iron**

Economy,Pa. B14 .....16.45

**BAR SHAPES, Hot-Rolled Alloy**

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

**BARS, C.F. Leaded (Including leaded extra)**

**Carbon**

LosAngeles P2 S30 ...11.75*

**Alloy**

Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

**BARS, Cold-Finished Carbon**

Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

**BARS, Cold-Finished Carbon (Turned and Ground)**

Cumberland,Md.(5) C19.6.55

**BARS, Cold-Finished Alloy**

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ....9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 .....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ....9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 .....9.225
S.Chicago,Ill. W14 .....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025

Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

**BARS, Reinforcing, Billet (To Fabricators)**

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ...6.375
Ft.Worth,Tex.(26) T4...5.50
Gary,Ind. U5 .....5.675
Houston S6 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KanssasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ....5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

**BARS, Reinforcing, Billet (Fabricated: To Consumers)**

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KanssasCity,Mo. S5 .....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ...7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

**BARS, Wrought Iron**

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

**BARS, Rail Steel**

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

## SHEETS

**SHEETS, Hot-Rolled Steel (18 Gage and Heavier)**

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

**SHEETS, H.R. (19 Ga. & Lighter)**

Niles,O. M21, S3 .....6.275

**SHEETS, H.R. Alloy**

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

**SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy**

Aliquippa,Pa. J5 .....7.525
Ashland,Ky A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

**SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)**

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

**SHEETS, Cold-Rolled Ingot Iron**

Cleveland R2 .....7.05
Middletown,O. A10 ...6.775
Warren,O. R2 .....7.05

**SHEETS, Cold-Rolled Steel (Commercial Quality)**

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

**SHEETS, Cold-Rolled, High-Strength, Low-Alloy**

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 ....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

**SHEETS, Culvert**

| | Cu Steel | Cu Fe |
|---|---|---|
| Ala.City,Ala. R2 | 7.225 | .... |
| Ashland,Ky. A10 | 7.225 | 7.475 |
| Canton,O. R2 | 7.225 | .... |
| Fairfield,Ala. T2 | 7.225 | 7.475 |
| Gary,Ind. U5 | 7.225 | 7.475 |
| GraniteCity,Ill.G4 | 7.325 | .... |
| Ind.Harbor I-2 | 7.225 | 7.475 |
| Irvin,Pa. U5 | 7.225 | 7.475 |
| Kokomo,Ind. C16 | 7.325 | .... |
| MartinsFry W10 | 7.225 | 7.475 |
| Pitts.,Calif. C11 | 7.975 | .... |
| Pittsburgh J5 | 7.225 | .... |
| SparrowsPt. B2 | 7.225 | .... |

**SHEETS, Culvert—Pure Iron**

Ind.Harbor,Ind. I-2....7.475

**SHEETS, Galvanized Steel Hot-Dipped**

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ....6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

**SHEETS, Galvanized High-Strength, Low-Alloy**

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

**SHEETS, Galvannealed Steel**

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

**SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)**

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

**SHEETS, Electrogalvanized**

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 .....7.50
Youngstown J5 .....7.50

**SHEETS, Well Casing**

Fontana,Calif. K1 .....7.325

**SHEETS, Aluminum Coated**

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

**SHEETS, Enameling**

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 ....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

**BLUED STOCK, 29 Gage**

Dover,O. E6 .....8.70
Ind Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

**SHEETS, Long Terne, Steel (Commercial Quality)**

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225*
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

**SHEETS, Long Terne, Ingot Iron**

Middletown,O. A10 ....7.625

## Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.
C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forging Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Wire Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.
U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.
V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.
W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

## STRIP

**STRIP, Hot-Rolled Carbon**

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 .....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5 .....5.10

**STRIP, Hot-Rolled Alloy**

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

**STRIP, Hot-Rolled High-Strength, Low-Alloy**

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3..8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

**STRIP, Hot-Rolled Ingot Iron**

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

**STRIP, Cold-Rolled Carbon**

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8 7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 .....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ...7.975

**STRIP, Cold-Rolled Alloy**

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 .....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

**STRIP, Cold-Rolled High-Strength, Low-Alloy**

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

**STRIP, Cold-Rolled Ingot Iron**

Warren,O. R2 .....8.175

**STRIP, Cold-Finished Spring Steel (Annealed)**

| | 0.26-0.40C | 0.41-0.60C | 0.61-0.80C | 0.81-1.05C | 1.06-1.35C |
|---|---|---|---|---|---|
| Anderson,Ind. G6 | 9.10 | .... | .... | .... | .... |
| Baltimore T6 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Boston T6 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Bristol,Conn. W1 | .... | 10.70 | 12.90 | 16.10 | 19.30 |
| Carnegie,Pa. S18 | 8.95 | 10.40 | 12.60 | 15.60 | .... |
| Cleveland A7 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Dearborn,Mich. S3 | 9.05 | 10.50 | 12.70 | .... | .... |
| Detroit D2 | 9.05 | 10.50 | 12.70 | 15.70 | .... |
| Dover,O. G6 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Evanston,Ill. M22 | 9.05 | 10.10 | 12.60 | 15.60 | .... |
| Farrell,Pa. S3 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Fostoria,O. S1 | 10.05 | 10.40 | 12.60 | 15.60 | .... |
| FranklinPark,Ill. T6 | 9.05 | 10.40 | 12.60 | 15.60 | 18.55 |
| Harrison,N.J. C18 | .... | .... | 12.90 | 16.10 | 19.30 |
| Indianapolis S41 | 9.10 | 10.55 | 12.60 | 15.60 | 18.55 |
| LosAngeles C1 | 11.15 | 12.60 | 14.80 | 17.80 | .... |
| LosAngeles S41 | 11.15 | 12.60 | 14.80 | .... | .... |
| NewBritain,Conn. S15 | 9.40 | 10.70 | 12.90 | 15.90 | 18.85 |
| NewCastle,Pa. B4, M23 | 8.95 | 10.10 | 12.60 | 15.60 | .... |
| NewHaven,Conn. D2 | 9.40 | 10.70 | 12.90 | 15.90 | .... |
| NewKensington,Pa. A6 | 8.95 | 10.40 | 12.60 | 15.60 | .... |
| New York W3 | .... | 10.70 | 12.90 | 16.10 | 19.30 |
| Pawtucket,R.I. N8 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Riverdale,Ill. A1 | 9.05 | 10.40 | 12.60 | 15.60 | 18.55 |
| Rome,N.Y. R6 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Sharon,Pa. S3 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Trenton,N.J. R5 | .... | 10.70 | 12.90 | 15.90 | 18.85 |
| Warren,O. T5 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Worcester,Mass. A7, T6 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Youngstown S41 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |

**Spring Steel (Tempered)**

| | Up to 0.80C | 0.81-1.05C | 1.06-1.35C |
|---|---|---|---|
| Bristol,Conn. W1 | ... | 18.55 | 22.95 | 27.80 |
| Buffalo W12 | ... | 18.55 | ... | .... |
| Fostoria,O. S1 | ... | 19.05 | 22.15 | .... |
| FranklinPark,Ill. T6 | ... | 19.20 | 23.30 | 28.15 |
| Harrison,N.J. C18 | ... | 18.85 | 22.95 | 27.80 |
| NewYork W3 | ... | 18.85 | 22.95 | 27.80 |
| Palmer,Mass. W12 | ... | 18.85 | .... | .... |
| Trenton,N.J. R5 | ... | 18.85 | 22.95 | 27.80 |
| Worcester,Mass. A7, T6 | ... | 18.85 | 22.95 | 27.80 |
| Youngstown S41 | ... | 19.20 | 23.30 | 28.15 |

**STRIP, C.R., Electrogalvanized**

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

**STRIP, Galvanized (Continuous)**

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

**TIGHT COOPERAGE HOOP**

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

## TIN MILL PRODUCTS

| TIN PLATE, Electrolytic (Base Box) | 0.25 lb | 0.50 lb | 0.75 lb |
|---|---|---|---|
| Aliquippa,Pa. J5 | $9.10 | $9.35 | $9.75 |
| Fairfield,Ala. T2 | 9.20 | 9.45 | 9.85 |
| Fairless,Pa. U5 | 9.20 | 9.45 | 9.85 |
| Fontana,Calif. K1 | 9.75 | 10.00 | 10.40 |
| Gary,Ind. U5 | 9.10 | 9.35 | 9.75 |
| GraniteCity,Ill. G4 | 9.20 | 9.45 | 9.85 |
| IndianaHarbor,Ind. I-2, Y1 | 9.10 | 9.35 | 9.75 |
| Irvin,Pa. U5 | 9.10 | 9.35 | 9.75 |
| Niles,O. R2 | 9.10 | 9.35 | 9.75 |
| Pittsburg,Calif. C11 | 9.75 | 10.00 | 10.40 |
| SparrowsPoint,Md. B2 | 9.10 | 9.35 | 9.75 |
| Weirton,W.Va. W6 | 9.10 | 9.35 | 9.75 |
| Yorkville,O. W10 | 9.10 | 9.35 | 9.75 |

**ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)**

| | | | |
|---|---|---|---|
| Aliquippa,Pa. J5 (21-27 Ga.) | 7.90 | 8.10 | .... |
| IndianaHarbor,Ind. Y1 (20-27 Ga.) | 7.90 | .... | .... |
| Niles,O. R2 (20-27 Ga.) | 7.90 | 8.10 | 8.30 |

| TIN PLATE, Hot Dipped Common Coke | 1.25 lb | 1.50 lb |
|---|---|---|
| Aliquippa,Pa. J5 | $10.40 | $10.65 |
| Fairfield,Ala. T2 | 10.50 | 10.75 |
| Fontana,Calif. K1 | 11.05 | 11.30 |
| Gary,Ind. U5 | 10.40 | 10.65 |
| Irvin,Pa. U5 | 10.40 | 10.65 |
| Pitts.,Calif. C11 | 11.05 | 11.30 |
| Sp.Pt.,Md. B2 | 10.40 | 10.65 |
| Weirton,W.Va. W6 | 10.40 | 10.65 |
| Yorkville,O. W10 | 10.40 | 10.65 |

**BLACK PLATE (Base Box)**

| | |
|---|---|
| Aliquippa,Pa. J5 | $8.20 |
| Fairfield,Ala. T2 | 8.30 |
| Fairless,Pa. U5 | 8.30 |
| Fontana,Calif. K1 | 8.85 |
| Gary,Ind. U5 | 8.20 |
| GraniteCity,Ill. G4 | 8.30 |
| Ind.Harbor,Ind. I-2, Y1 | 8.20 |
| Irvin,Pa. U5 | 8.20 |
| Niles,O. R2 | 8.20 |
| Pittsburg,Calif. C11 | 8.85 |
| SparrowsPoint,Md. B2 | 8.20 |
| Weirton,W.Va. W6 | 8.20 |
| Yorkville,O. W10 | 8.20 |

**HOLLOWARE ENAMELING Black Plate (29 Gage)**

| | |
|---|---|
| Aliquippa,Pa. J5 | 7.85 |
| Gary,Ind. U5 | 7.85 |
| GraniteCity,Ill. G4 | 7.95 |
| Ind.Harbor,Ind. Y1 | 7.85 |
| Irvin,Pa. U5 | 7.85 |
| Yorkville,O. W10 | 7.85 |

**MANUFACTURING TERNES (Special Coated, Base Box)**

| | |
|---|---|
| Gary,Ind. U5 | $10.05 |
| Irvin,Pa. U5 | 10.05 |

## SILICON STEEL

**C.R. COILS & CUT LENGTHS (22 Ga.)**

| Fully Processed (Semiprocessed ½c lower) | Field | Armature | Electric | Motor | Dynamo |
|---|---|---|---|---|---|
| BeechBottom,W.Va. W10 | .... | 11.70 | 12.40 | 13.35 | 14.05 |
| Brackenridge,Pa. A4 | .... | .... | 12.40 | 13.55 | 14.05 |
| GraniteCity,Ill. G4 | 9.975* | 11.30* | 12.00* | 13.15* | .... |
| IndianaHarbor,Ind. I-2 | 9.875* | 11.20* | 11.90* | 13.05* | .... |
| Mansfield,O. E6 | 9.875* | 11.70 | 12.40 | 13.55 | 14.05 |
| Newport,Ky. A2 | 9.875 | 11.70* | 12.40* | 13.55* | 14.65* |
| Niles,O. M21 | 9.875* | 11.70 | 12.40 | 13.55 | .... |
| Vandergrift,Pa. U5 | 9.875* | 11.70 | 12.40 | 13.55 | 14.65 |
| Warren,O. R2 | 9.875* | 11.70 | 12.40 | 13.55 | 14.65 |
| Zanesville,O. A10 | .... | 11.70† | 12.40 | 13.55 | 14.65 |

| | Stator |
|---|---|
| Vandergrift,Pa. U5 | 8.10 |
| Mansfield,O. E6 | 8.10 |
| Warren,O. R2 (Silicon Lowcore) | 8.10 |

**SHEETS (22 Ga., coils & cut lengths)**

| Fully Processed (Semiprocessed ½c lower) | T-72 | T-65 | T-58 | T-52 |
|---|---|---|---|---|
| BeechBottom,W.Va. W10 | 15.70 | 16.30 | 16.80 | 17.85 |
| Vandergrift,Pa. U5 | 15.70 | 16.30 | 16.80 | 17.85 |
| Zanesville,O. A10 | 15.70 | 16.30 | 16.80 | 17.85 |

| C.R. COILS & CUT LENGTHS (22 Ga.) | Grain Oriented T-100 | T-90 | T-80 | T-73 | T-66 | T-72 |
|---|---|---|---|---|---|---|
| Brackenridge,Pa. A4 | .... | 18.10 | 19.70 | 20.20 | 20.70 | 15.70†† |
| Butler,Pa. A10 | .... | .... | 19.70 | 20.20 | 20.70 | .... |
| Vandergrift,Pa. U5 | 17.10 | 18.10 | 19.70 | 20.20 | 20.70 | 15.70 |
| Warren,O. R2 | .... | .... | .... | .... | .... | 15.70‡ |

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

## WIRE

**WIRE, Manufacturers Bright, Low Carbon**

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 ....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 .....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

**WIRE, Cold Heading Carbon**

Elyria,O. W8 .....8.00

**WIRE, Gal'd., for ACSR**

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 ....13.40
KansasCity,Mo. U3 ..12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

**WIRE, Upholstery Spring**

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 .9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

**WIRE, MB Spring, High-Carbon**

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Millbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

**WIRE, Fine & Weaving(8" Coils)**

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

**ROPE WIRE (A)**

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St. Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.85
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

**WIRE, Tire Bead**

| | |
|---|---|
| Bartonville,Ill. K4 | 17.15 |
| Monessen,Pa. P16 | 17.15 |
| Roebling,N.J. R5 | 17.65 |

**WIRE, Cold-Rolled Flat**

| | |
|---|---|
| Anderson,Ind. G6 | 12.35 |
| Baltimore T6 | 12.65 |
| Boston T6 | 12.65 |
| Buffalo W12 | 12.35 |
| Chicago W13 | 12.45 |
| Cleveland A7 | 12.35 |
| Crawfordsville,Ind. M8 | 12.35 |
| Dover,O. G6 | 12.35 |
| Farrell,Pa. S3 | 12.35 |
| Fostoria,O. S1 | 12.35 |
| FranklinPark,Ill. T6 | 12.45 |
| Kokomo,Ind. C16 | 12.35 |
| Massillon,O. R8 | 12.35 |
| Milwaukee C23 | 12.55 |
| Monessen,Pa. P7, P16 | 12.35 |
| Palmer, Mass. W12 | 12.65 |
| Pawtucket,R.I. N8 | 12.65 |
| Philadelphia P24 | 12.65 |
| Riverdale,Ill. A1 | 12.45 |
| Rome,N.Y. R6 | 12.35 |
| Sharon,Pa. S3 | 12.35 |
| Trenton,N.J. R5 | 12.65 |
| Warren,O. B9 | 12.35 |
| Worcester,Mass. A7,T6 | 12.65 |

**NAILS, Stock Sizes**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 173 |
| Aliquippa,Pa. J5 | 173 |
| Atlanta A11 | 173 |
| Bartonville,Ill. K4 | 175 |
| Chicago W13 | 173 |
| Cleveland A9 | 173 |
| Crawfordsville,Ind. M8 | 175 |
| Donora,Pa. A7 | 173 |
| Duluth A7 | 173 |
| Fairfield,Ala. T2 | 173 |
| Houston S5 | 178 |
| Jacksonville,Fla. M8 | 175 |
| Johnstown,Pa. B2 | 173 |
| Joliet,Ill. A7 | 173 |
| KansasCity,Mo. S5 | 178 |
| Kokomo,Ind. C16 | 175 |
| Minnequa,Colo. C10 | 178 |
| Monessen,Pa. P7 | 173 |
| Pittsburg,Calif. C11 | 192 |
| Rankin,Pa. A7 | 173 |
| S.Chicago,Ill. R2 | 173 |
| SparrowsPt.,Md. B2 | 175 |
| Sterling,Ill.(7) N15 | 175 |
| Worcester,Mass. A7 | 179 |

**(To Wholesalers: per cwt)**

| | |
|---|---|
| Galveston,Tex. D7 | $10.30 |

**NAILS, CUT (100 lb kegs)**

| | |
|---|---|
| Wheeling,W.Va., W10 | $10.10 |

**POLISHED STAPLES**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 175 |
| Aliquippa,Pa. J5 | 173 |
| Atlanta A11 | 173 |
| Bartonville,Ill. K4 | 175 |
| Crawfordsville,Ind. M8 | 177 |
| Donora,Pa. A7 | 173 |
| Duluth A7 | 173 |
| Fairfield,Ala. T2 | 173 |
| Houston S5 | 180 |
| Jacksonville,Fla. M8 | 177 |
| Johnstown,Pa. B2 | 175 |
| Joliet,Ill. A7 | 173 |
| KansasCity,Mo. S5 | 180 |
| Kokomo,Ind. C16 | 177 |
| Minnequa,Colo. C10 | 178 |
| Pittsburg,Calif. C11 | 194 |
| Rankin,Pa. A7 | 173 |
| S.Chicago,Ill. R2 | 175 |
| SparrowsPt.,Md. B2 | 177 |
| Sterling,Ill.(7) N15 | 175 |
| Worcester,Mass. A7 | 179 |

**TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150**

| | |
|---|---|
| AlabamaCity,Ala. R2 | $8.78 |
| Atlanta A11 | 10.36 |
| Bartonville,Ill. K4 | 8.88 |
| Buffalo W12 | 10.26 |
| Chicago W13 | 9.24 |
| Crawfordsville,Ind. M8 | 8.88 |
| Donora,Pa. A7 | 8.78 |
| Duluth A7 | 8.78 |
| Fairfield,Ala. T2 | 8.78 |
| Houston S5 | 10.51 |
| Jacksonville,Fla. M8 | 8.88 |
| Johnstown,Pa. B2 | 8.78 |
| Joliet,Ill. A7 | 8.78 |
| KansasCity,Mo. S5 | 10.51 |
| Kokomo,Ind. C16 | 8.88 |
| LosAngeles B3 | 9.44 |
| Minnequa,Colo. C10 | 9.02 |
| Pittsburg,Calif. C11 | 9.44 |
| S.Chicago,Ill. R2 | 8.78 |
| S.SanFrancisco C10 | 9.94 |
| SparrowsPt.,Md. B2 | 8.88 |
| Sterling,Ill.(37) N15 | 8.88 |

**Coil No. 6500 Stand.**

| | |
|---|---|
| AlabamaCity,Ala. R2 | $9.06 |
| Atlanta A11 | 10.70 |
| Bartonville,Ill. K4 | 9.16 |
| Buffalo W12 | 10.60 |
| Chicago W13 | 9.54 |
| Crawfordsville,Ind. M8 | 9.16 |
| Donora,Pa. A7 | 9.06 |
| Duluth A7 | 9.06 |
| Fairfield,Ala. T2 | 9.06 |
| Houston S5 | 10.85 |
| Jacksonville,Fla. M8 | 9.16 |
| Johnstown,Pa. B2 | 9.06 |
| Joliet,Ill. A7 | 9.06 |
| KansasCity,Mo. S5 | 10.85 |
| Kokomo,Ind. C16 | 9.16 |
| LosAngeles B3 | 9.75 |
| Minnequa,Colo. C10 | 9.30 |
| Pittsburg,Calif. C11 | 9.75 |
| S.Chicago,Ill. R2 | 9.06 |
| S.SanFrancisco C10 | 10.26 |
| SparrowsPt.,Md. B2 | 9.16 |
| Sterling,Ill.(37) N15 | 9.16 |

**Coil No. 6500 Interim**

| | |
|---|---|
| AlabamaCity,Ala. R2 | $9.11 |
| Atlanta A11 | 10.75 |
| Bartonville,Ill. K4 | 9.21 |
| Buffalo W12 | 10.65 |
| Chicago W13 | 9.59 |
| Crawfordsville,Ind. M8 | 9.21 |
| Donora,Pa. A7 | 9.11 |
| Duluth A7 | 9.11 |
| Fairfield,Ala. T2 | 9.11 |
| Houston S5 | 10.90 |
| Jacksonville,Fla. M8 | 9.21 |
| Johnstown,Pa. B2 | 9.11 |
| Joliet,Ill. A7 | 9.11 |
| KansasCity,Mo. S5 | 10.96 |
| Kokomo,Ind. C16 | 9.21 |
| LosAngeles B3 | 9.80 |
| Minnequa,Colo. C10 | 9.35 |
| Pittsburg,Calif. C11 | 9.80 |
| S.Chicago,Ill. R2 | 9.11 |
| S.SanFrancisco C10 | 10.31 |
| SparrowsPt.,Md. B2 | 9.21 |
| Sterling,Ill.(37) N15 | 9.21 |

**BALE TIES, Single Loop**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 212 |
| Atlanta A11 | 212 |
| Bartonville,Ill. K4 | 214 |
| Crawfordsville,Ind. M8 | 214 |
| Donora,Pa. A7 | 212 |
| Duluth A7 | 212 |
| Fairfield,Ala. T2 | 212 |
| Houston S5 | 217 |
| Jacksonville,Fla. M8 | 214 |
| Joliet,Ill. A7 | 212 |
| KansasCity,Mo. S5 | 217 |
| Kokomo,Ind. C16 | 214 |
| Minnequa,Colo. C10 | 217 |
| S.SanFrancisco C10 | 236 |
| SparrowsPt.,Md. B2 | 214 |
| Sterling,Ill.(7) N15 | 214 |

**FENCE POSTS**

| | Col. |
|---|---|
| Birmingham C15 | 177 |
| ChicagoHts.,Ill. C2, I-2 | 177 |
| Duluth A7 | 177 |
| Franklin,Pa. F5 | 177 |
| Johnstown,Pa. B2 | 177 |
| Marion,O. P11 | 177 |
| Minnequa,Colo. C10 | 182 |
| Tonawanda,N.Y. B12 | 177 |

**WIRE, Barbed**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 193** |
| Aliquippa,Pa. J5 | 190§ |
| Atlanta A11 | 197* |
| Bartonville,Ill. K4 | 199 |
| Crawfordsville,Ind. M8 | 198 |
| Donora,Pa. A7 | 193† |
| Duluth A7 | 193† |
| Fairfield,Ala. T2 | 193† |
| Houston S5 | 198** |
| Jacksonville,Fla. M8 | 198 |
| Johnstown,Pa. B2 | 196§ |
| Joliet,Ill. A7 | 193† |
| KansasCity,Mo. S5 | 198** |
| Kokomo,Ind. C16 | 195† |
| Minnequa,Colo. C10 | 198** |
| Monessen,Pa. P7 | 196§ |
| Pittsburg,Calif. C11 | 213† |
| Rankin,Pa. A7 | 193† |
| S.Chicago,Ill. R2 | 193** |
| S.SanFrancisco C10 | 213* |
| SparrowsPoint,Md. B2 | 198§ |
| Sterling,Ill.(7) N15 | 198 |

**WOVEN FENCE, 9-15 Ga.**

| | Col. |
|---|---|
| Ala.City,Ala. R2 | 187** |
| Aliq'ppa,Pa.9-11½ga.J5 | 190§ |
| Atlanta A11 | 191* |
| Bartonville,Ill. K4 | 193 |
| Crawfordsville,Ind. M8 | 192 |
| Donora,Pa. A7 | 187† |
| Duluth A7 | 187† |
| Fairfield,Ala. T2 | 187† |
| Houston S5 | 192** |
| Jacksonville,Fla. M8 | 192 |
| Johnstown,Pa.(43) B2 | 190§ |
| Joliet,Ill. A7 | 187† |
| KansasCity,Mo. S5 | 192** |
| Kokomo,Ind. C16 | 189† |
| Minnequa,Colo. C10 | 192** |
| Pittsburg,Calif. C11 | 210† |
| Rankin,Pa. A7 | 187† |
| S.Chicago,Ill. R2 | 187** |
| Sterling,Ill.(7) N15 | 192 |

**WIRE (16 gage)**

| | An'ld Stone | Galv. Stone |
|---|---|---|
| Ala.City,Ala.R2 | 17.85 | 19.40** |
| Ali'ppa,Pa. J5 | 17.85 | 19.65 |
| Bartonville K4 | 17.95 | 19.80 |
| Cleveland A7 | 17.85 | .... |
| Craw'sville M8 | 17.95 | 19.80‡‡ |
| Fostoria,O. S1 | 18.35 | 19.90† |
| Houston S5 | 18.10 | 19.65** |
| Jacksonville M8 | 18.95 | 19.80‡‡ |
| Johnstown B2 | 17.85 | 19.65§ |
| Kan.City,Mo. S5 | 18.10 | .... |
| Kokomo C16 | 17.95 | 19.50† |
| Minnequa C10 | 18.10 | 19.65** |
| P'im'r,Mass.W12 | 18.15 | 19.70† |
| Pitts.,Calif. C11 | 18.20 | 19.75† |
| S SanFran. C10 | 18.20 | 19.75** |
| St'ling(37) N15 | 17.95 | 19.80 |
| SparrowsPt. B2 | 17.95 | 19.75§ |
| Waukegan A7 | 17.85 | 19.40† |
| Worcester A7 | 18.15 | .... |

**WIRE, Merchant Quality (6 to 8 gage)**

| | An'ld | Galv. |
|---|---|---|
| Ala.City,Ala. R2 | 9.00 | 9.55** |
| Aliquippa J5 | 8.65 | 9.325§ |
| Atlanta(48) A11 | 9.00 | 9.75* |
| Bartonville(48) K4 | 9.85 | 19.90 |
| Buffalo W12 | 9.00 | 9.55† |
| Cleveland A7 | 9.00 | .... |
| Crawfordsville M8 | 9.10 | 9.80†† |
| Donora,Pa. A7 | 9.00 | 9.55† |
| Duluth A7 | 9.00 | 9.55† |
| Fairfield T2 | 9.00 | 9.55† |
| Houston(48) S5 | 9.25 | 9.80** |
| Jack'ville,Fla. M8 | 9.10 | 9.80‡‡ |
| Johnstown(48) B2 | 9.00 | 9.675§ |
| Joliet,Ill. A7 | 9.00 | 9.55† |
| KansasCity(48) S6 | 9.25 | 9.80** |
| Kokomo(48) S16 | 9.10 | 9.65† |
| LosAngeles B3 | 9.95 | 10.625§ |
| Minnequa C10 | 9.25 | 9.80** |
| Monessen(48) P7 | 8.65 | 9.35§ |
| Palmer,Mass. W12 | 9.30 | 9.85† |
| Pitts.,Calif. C11 | 9.95 | 10.50† |
| Rankin,Pa. A7 | 9.00 | 9.55† |
| S.Chicago R2 | 9.00 | 9.55** |
| S.SanFran. C10 | 9.95 | 10.50** |
| Spar'wsPt.(48)B2 | 9.10 | 9.775§ |
| St'ling(37)(48)N15 | 9.10 | 9.80 |
| Struthers,O. Y1 | 9.00 | 9.65‡ |
| Worcester,Mass.A7 | 9.30 | 9.85† |

Based on zinc prices of: *13.50c. †6c. ‡10c. §Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

## FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

**HEX HEAD CAP SCREWS,** coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

| | |
|---|---|
| Plain Finish | 50 |
| Hot Galvanized and Zinc Plated: | |
| Packaged | 43.75 |
| Bulk | 50 |

**BOLTS,** Standard stock sizes:

| | |
|---|---|
| Plain Finish | 50 |
| Hot Galvanized and Zinc Plated: | |
| Packaged | 43.75 |
| *Bulk | 50 |

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

**HEXAGON NUTS, American Standard:** Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

**SQUARE NUTS, American Standard:** Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

| | |
|---|---|
| Plain Finish | 50 |
| Hot Galvanized and Zinc Plated: | |
| Packages | 43.75 |
| Bulk | 50 |

**CAP AND SETSCREWS,**

**Fillister Head, Cap Screws, Coarse Thread:**

| | |
|---|---|
| Packages | +55 |
| Bulk | +16 |

**Flat Head Cap Screws:** ¾ in. and smaller, 6 in. and shorter:

| | |
|---|---|
| Packages | +85 |
| Bulk | +38 |

**Setscrews, Square Head, Cup Point, Coarse Thread:**

| | |
|---|---|
| Through 1 in. diam., 6 in. and shorter: | |
| Packages | +5 |
| Bulk | 19 |
| Through 1 in. diam., longer than 6 in.: | |
| Packages | +29 |

## RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

## PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

| | Standard Diameter, Inches | | | | |
|---|---|---|---|---|---|
| | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 |
| Buffalo W12 | $26.20 | $38.50 | $47.90 | $61.30 | $80.30 |
| KansasCity,Mo. U3 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |
| Minnequa,Colo. C10 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |
| Pittsburg,Calif. C11 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |
| Roebling,N.J. R5 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |
| SparrowsPoint,Md. B2 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |
| St.Louis L8 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |
| Waukegan,Ill. A7 | 26.20 | 38.50 | 47.90 | 61.30 | 80.30 |

## BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

| O.D. In. | B.W. Gage | Seamless H.R. | Seamless C.D. | Elec. Weld H.R. |
|---|---|---|---|---|
| 1 | 13 | .... | 27.24 | 23.13 |
| 1¼ | 13 | .... | 32.25 | 24.41 |
| 1½ | 13 | 30.42 | 35.65 | 26.98 |
| 1¾ | 13 | 35.94 | 42.12 | 31.89 |
| 2 | 13 | 46.28 | 47.21 | 35.74 |
| 2¼ | 13 | 45.36 | 53.17 | 40.26 |
| 2½ | 12 | 49.24 | 57.72 | 43.70 |
| 2½ | 12 | 54.23 | 63.57 | 48.13 |
| 2¾ | 12 | 58.78 | 68.83 | 52.13 |
| 3 | 12 | 62.62 | 73.40 | 55.59 |

## RAILWAY MATERIALS

| Rails | Standard No. 1 | Standard No. 2 | All No. 2 | Tee Rails 60 lb Under |
|---|---|---|---|---|
| Bessemer,Pa. U5 | 5.75 | 5.65 | .... | 6.725 |
| Ensley,Ala. T2 | 5.75 | 5.65 | .... | 6.725 |
| Fairfield,Ala. T2 | .... | .... | .... | 6.725 |
| Gary,Ind. U5 | 5.75 | 5.65 | .... | .... |
| Huntington,W.Va. C15 | .... | .... | .... | 6.725 |
| Johnstown,Pa. B2 | .... | .... | .... | (16)6.725 |
| Lackawanna,N.Y. B2 | 5.75 | 5.65 | .... | 6.725 |
| Minnequa,Colo. C10 | 5.75 | 5.65 | .... | 7.225 |
| Steelton,Pa. B2 | 5.75 | 5.65 | .... | .... |
| Williamsport,Pa. S19 | .... | .... | .... | 6.725 |

**TIE PLATES**

| | |
|---|---|
| Fairfield,Ala. T2 | 6.875 |
| Gary,Ind. U5 | 6.875 |
| Lackawanna,N.Y. B2 | 6.875 |
| Minnequa,Colo. C10 | 6.875 |
| Seattle B3 | 7.025 |
| Steelton,Pa. B2 | 6.875 |
| Torrance,Calif. C11 | 7.025 |

**JOINT BARS**

| | |
|---|---|
| Bessemer,Pa. U5 | 7.25 |
| Fairfield,Ala. T2 | 7.25 |
| Joliet,Ill. U5 | 7.25 |
| Lackawanna,N.Y. B2 | 7.25 |
| Minnequa,Colo. C10 | 7.25 |
| Steelton,Pa. B2 | 7.25 |

**AXLES**

| | |
|---|---|
| Ind.Harbor,Ind. S13 | 9.125 |
| Johnstown,Pa. B2 | 9.125 |

**SCREW SPIKES**

| | |
|---|---|
| Lebanon,Pa. B2 | 15.10 |

**TRACK BOLTS, Untreated**

| | |
|---|---|
| Cleveland R2 | 15.35 |
| KansasCity,Mo. S5 | 15.35 |
| Lebanon,Pa. B2 | 15.35 |
| Minnequa,Colo. C10 | 15.35 |
| Pittsburgh S44 | 15.35 |
| Seattle B3 | 15.85 |

**STANDARD TRACK SPIKES**

| | |
|---|---|
| Fairfield,Ala T2 | 10.10 |
| Ind.Harbor,Ind. I-2, Y1 | 10.10 |
| KansasCity,Mo. S5 | 10.10 |
| Lebanon,Pa. B2 | 10.10 |
| Minnequa,Colo. C10 | 10.10 |
| Pittsburgh J5 | 10.10 |
| Seattle B3 | 10.60 |
| S.Chicago,Ill. R2 | 10.10 |
| Struthers,O. Y1 | 10.10 |
| Youngstown R2 | 10.10 |

**Footnotes**

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅝″ and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72″ and narrower.
(36) 54″ and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60″ & narrower.
(39) 48″ and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

## SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| Size—Inches | 2 | | 2½ | | 3 | | 3½ | | 4 | | 5 | | 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 37c | | 58.5c | | 76.5c | | 92c | | $1.09 | | $1.48 | | $1.92 | |
| Pounds Per Ft | 3.68 | | 5.82 | | 7.62 | | 9.20 | | 10.89 | | 14.81 | | 19.18 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | +12.25 | +28.75 | +5.75 | +23.5 | +3.25 | +21 | +1.75 | +19.5 | +1.75 | +19.5 | +2 | +19.75 | 0.5 | +17.25 |
| Ambridge, Pa. N2 | +12.25 | .... | +5.75 | .... | +3.25 | .... | +1.75 | .... | +1.75 | .... | +2 | .... | 0.5 | .... |
| Lorain, O. N3 | +12.25 | +28.75 | +5.75 | +23.5 | +3.25 | +21 | +1.75 | +19.5 | +1.75 | +19.5 | +2 | +19.75 | 0.5 | +17.25 |
| Youngstown Y1 | +12.25 | +28.75 | +5.75 | +23.5 | +3.25 | +21 | +1.75 | +19.5 | +1.75 | +19.5 | +2 | +19.75 | 0.5 | +17.25 |

## ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Youngstown R2 | +12.25 | +28.75 | +5.75 | +23.5 | +3.25 | +21 | +1.75 | +19.5 | +1.75 | +19.5 | +2 | +19.75 | 0.5 | +17.25 |

## BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| Size—Inches | ⅛ | | ¼ | | ⅜ | | ½ | | ¾ | | 1 | | 1¼ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 5.5c | | 6c | | 6c | | 8.5c | | 11.5c | | 17c | | 23c | |
| Pounds Per Ft | 0.24 | | 0.42 | | 0.57 | | 0.85 | | 1.13 | | 1.68 | | 2.28 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | .... | .... | .... | .... | .... | .... | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |
| Alton, Ill. L1 | .... | .... | .... | .... | .... | .... | 0.25 | +17 | 3.25 | +13 | 6.75 | +8.5 | 9.25 | +7.25 |
| Benwood, W. Va. W10 | 1.5 | +27 | +10.5 | +36 | +21 | +45.5 | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |
| Butler, Pa. F6 | 4.5 | +24 | +8.5 | +34 | +19.5 | +44 | .... | .... | .... | .... | .... | .... | .... | .... |
| Etna, Pa. N2 | .... | .... | .... | .... | .... | .... | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |
| Fairless, Pa. N3 | .... | .... | .... | .... | .... | .... | 0.25 | +17 | 3.25 | +13 | 6.75 | +8.5 | 9.25 | +7.25 |
| Fontana, Calif. K1 | .... | .... | .... | .... | .... | .... | +10.75 | +28 | +7.75 | +24 | +4.25 | +19.5 | +1.75 | +18.25 |
| Indiana Harbor, Ind. Y1 | .... | .... | .... | .... | .... | .... | 1.25 | +16 | 4.25 | +12 | 7.75 | +7.5 | 10.25 | +6.25 |
| Lorain, O. N3 | .... | .... | .... | .... | .... | .... | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |
| Sharon, Pa. S4 | 4.5 | +24 | +8.5 | +34 | +19.5 | +44 | .... | .... | .... | .... | .... | .... | .... | .... |
| Sharon, Pa. M6 | .... | .... | .... | .... | .... | .... | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |
| Sparrows Pt., Md. B2 | 2.5 | +26 | +10.5 | +36 | +21.5 | +46 | 0.25 | +17 | 3.25 | +13 | 6.75 | +8.5 | 9.25 | +7.25 |
| Wheatland, Pa. W9 | 4.5 | +24 | +8.5 | +34 | +19.5 | +44 | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |
| Youngstown R2, Y1 | .... | .... | .... | .... | .... | .... | 2.25 | +15 | 5.25 | +11 | 8.75 | +6.5 | 11.25 | +5.25 |

| Size—Inches | 1½ | | 2 | | 2½ | | 3 | | 3½ | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 27.5c | | 37c | | 58.5c | | 76.5c | | 92c | | $1.09 | |
| Pounds Per Ft | 2.75 | | 3.68 | | 5.82 | | 7.62 | | 9.20 | | 10.89 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | 3.25 | +14.5 | 3.25 | +14.5 |
| Alton, Ill. L1 | 9.75 | +6.25 | 10.25 | +5.75 | 11.75 | +5.5 | 11.75 | +5.5 | 1.25 | +16.5 | 1.25 | +16.5 |
| Benwood, W. Va. W10 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | 3.25 | +14.5 | 3.25 | +14.5 |
| Etna, Pa. N2 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | 3.25 | +14.5 | 3.25 | +14.5 |
| Fairless, Pa. N3 | 9.75 | +6.25 | 10.25 | +5.75 | 11.75 | +5.5 | 11.75 | +5.5 | 1.25 | +16.5 | 1.25 | +16.5 |
| Fontana, Calif. K1 | +1.25 | +17.25 | +0.75 | +16.75 | 0.75 | +16.5 | 0.75 | +16.5 | +9.75 | +27.5 | +9.75 | +27.5 |
| Indiana Harbor, Ind. Y1 | 10.75 | +5.25 | 11.25 | +4.75 | 12.75 | +4.5 | 12.75 | +4.5 | 2.25 | +15.5 | 2.25 | +15.5 |
| Lorain, O. N3 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | .... | .... | .... | .... |
| Sharon, Pa. M6 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | .... | .... | .... | .... |
| Sparrows Pt., Md. B2 | 9.75 | +6.25 | 10.25 | +5.75 | 11.75 | +5.5 | 11.75 | +5.5 | 1.25 | +16.5 | 1.25 | +16.5 |
| Wheatland, Pa. W9 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | 3.25 | +14.5 | 3.25 | +14.5 |
| Youngstown R2, Y1 | 11.75 | +4.25 | 12.25 | +3.75 | 13.75 | +3.5 | 13.75 | +3.5 | 3.25 | +14.5 | 3.25 | +14.5 |

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

# Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

| AISI | —Rerolling— | | Forging | H.R. | H.R. Rods; C.F. | Bars; Structural | | | C.R. Strip; Flat |
|---|---|---|---|---|---|---|---|---|---|
| Type | Ingot | Slabs | Billets | Strip | Wire | Shapes | Plates | Sheets | Wire |
| 201 | 22.75 | 25.00 | .... | 36.00 | .... | 43.50 | 39.25 | 48.50 | 45.00 |
| 202 | 24.75 | 28.25 | 37.75 | 30.00 | 42.25 | 44.50 | 40.00 | 40.25 | 49.25 |
| 301 | 24.00 | 26.00 | 38.75 | 37.25 | 43.50 | 46.00 | 41.25 | 51.25 | 47.50 |
| 302 | 26.25 | 29.50 | 39.50 | 40.50 | 44.25 | 46.75 | 42.25 | 52.00 | 52.00 |
| 302B | 26.50 | 30.75 | 42.25 | 45.75 | 46.75 | 49.00 | 44.50 | 57.00 | 57.00 |
| 303 | .... | 33.25 | 42.50 | .... | 47.25 | 49.75 | 45.00 | 56.75 | 56.75 |
| 304 | 28.00 | 31.25 | 42.00 | 43.75 | 47.00 | 49.50 | 45.75 | 55.00 | 55.00 |
| 304L | .... | .... | 49.75 | 51.50 | 54.75 | 57.25 | 53.50 | 62.75 | 62.75 |
| 305 | 29.50 | 34.75 | 44.00 | 47.50 | 47.00 | 49.50 | 46.25 | 58.75 | 58.75 |
| 308 | 32.00 | 36.25 | 49.00 | 50.25 | 54.75 | 57.75 | 55.25 | 63.00 | 63.00 |
| 309 | 41.25 | 47.50 | 60.00 | 64.50 | 66.25 | 69.50 | 66.00 | 80.50 | 80.50 |
| 310 | 51.50 | 59.50 | 81.00 | 84.25 | 89.75 | 94.50 | 87.75 | 96.75 | 96.75 |
| 314 | .... | .... | 80.50 | .... | 89.75 | 94.50 | 87.75 | .... | 104.25 |
| 316 | 41.25 | 47.50 | 64.50 | 68.50 | 71.25 | 75.75 | 71.75 | 80.75 | 80.75 |
| 316L | .... | .... | 72.25 | 76.25 | 79.50 | 83.50 | 79.50 | 88.50 | 88.50 |
| 317 | 49.75 | 58.00 | 79.75 | 88.25 | 89.50 | 94.25 | 88.50 | 101.00 | 101.00 |
| 321 | 33.50 | 38.00 | 48.75 | 53.50 | 54.50 | 57.50 | 54.75 | 65.00 | 65.50 |
| 330 | .... | .... | 123.25 | .... | 113.00 | 143.75 | 135.00 | 149.25 | 149.25 |
| 18-8 CbTa | 38.50 | 48.25 | 57.75 | 63.50 | 63.75 | 67.25 | 64.75 | 79.25 | 79.25 |
| 403 | .... | .... | 29.25 | .... | 33.25 | 35.00 | 30.00 | 40.25 | 40.25 |
| 405 | 20.25 | 28.50 | 30.75 | 36.00 | 34.75 | 36.50 | 32.50 | 46.75 | 46.75 |
| 410 | 17.50 | 19.50 | 29.25 | 31.00 | 33.25 | 35.00 | 30.00 | 40.25 | 40.25 |
| 416 | .... | .... | 29.75 | .... | 33.75 | 35.50 | 31.25 | 48.25 | 48.25 |
| 420 | .... | 31.50 | 35.50 | 41.75 | 40.75 | 42.75 | 40.25 | 62.00 | 62.00 |
| 430 | 17.75 | 19.75 | 29.75 | 32.00 | 33.75 | 35.50 | 31.00 | 40.75 | 40.75 |
| 430F | .... | .... | 30.50 | .... | 34.25 | 36.00 | 31.75 | 51.75 | 51.75 |
| 431 | .... | 29.75 | 39.25 | .... | 43.50 | 46.00 | 41.00 | 56.00 | 56.00 |
| 446 | .... | .... | 40.75 | 59.00 | 46.00 | 48.25 | 42.75 | 70.00 | 70.00 |

**Producers Are:** Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstal Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

# Clad Steel

| | Plates | | | | Sheets |
|---|---|---|---|---|---|
| | Carbon Base | | | | Carbon Base |
| Stainless | 5% | 10% | 15% | 20% | 20% |
| 302 | .... | .... | .... | .... | 37.50 |
| 304 | 26.05 | 28.80 | 31.55 | 34.30 | 39.75 |
| 304L | 30.50 | 33.75 | 36.95 | 40.15 | .... |
| 316 | 38.20 | 42.20 | 46.25 | 50.25 | 58.25 |
| 316L | 42.30 | 46.75 | 51.20 | 55.65 | .... |
| 316 Cb | 49.90 | 55.15 | 60.40 | 65.65 | .... |
| 321 | 31.20 | 34.50 | 37.75 | 41.05 | 47.25 |
| 347 | 36.90 | 40.80 | 44.65 | 48.55 | 57.00 |
| 405 | 22.25 | 24.60 | 26.90 | 29.25 | .... |
| 410 | 20.55 | 22.70 | 24.85 | 27.00 | .... |
| 430 | 21.20 | 23.45 | 25.65 | 27.90 | .... |
| Inconel | 49.80 | 61.35 | 72.80 | 84.40 | .... |
| Nickel | 43.20 | 55.05 | 66.95 | 78.90 | .... |
| Nickel, Low Carbon | 43.50 | 55.70 | 67.95 | 80.35 | .... |
| Monel | 44.25 | 55.35 | 66.45 | 77.60 | .... |

| | Strip, Carbon Base —Cold Rolled— | |
|---|---|---|
| | 10% | Both Sides |
| Copper* | 36.80 | 44.20 |

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

# Tool Steel

| Grade | $ per lb | Grade | $ per lb |
|---|---|---|---|
| Reg. Carbon (W-1) | 0.330 | Hi-Carbon-Cr (D-11) | 0.955 |
| Spec. Carbon (W-1) | 0.385 | V-Cr Hot Work (H-13) | 0.550 |
| Oil Hardening (O-1) | 0.505 | W-Cr Hot Work (H-12) | 0.530 |
| V-Cr Hot Work (H-11) | 0.505 | W Hot Wk (H-21) | 1.425-1.44 |

| Grade by Analysis (%) | | | | | AISI | |
|---|---|---|---|---|---|---|
| W | Cr | V | Co | Mo | Designation | $ per lb |
| 18 | 4 | 1 | .... | ... | T-1 | 1.840 |
| 18 | 4 | 2 | .... | ... | T-2 | 2.005 |
| 13.5 | 4 | 3 | .... | ... | T-3 | 2.105 |
| 18.25 | 4.25 | 1 | 4.75 | ... | T-4 | 2.545 |
| 18 | 4 | 2 | 9 | ... | T-5 | 2.915 |
| 20.25 | 4.25 | 1.6 | 12.95 | ... | T-6 | 4.330 |
| 13.75 | 3.75 | 2 | 5 | ... | T-8 | 2.485 |
| 1.5 | 4 | 1 | .... | 8.5 | M-1 | 1.200 |
| 6.4 | 4.5 | 1.9 | .... | 5 | M-2 | 1.345 |
| 6 | 4 | 3 | .... | 6 | M-3 | 1.590 |

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

# Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Minimum delivered prices are approximate and based on rail shipment.

| | Basic | No. 2 Foundry | Malleable | Bessemer |
|---|---|---|---|---|
| *Birmingham District* | | | | |
| Birmingham R2 | 62.00 | 62.50** | .... | .... |
| Birmingham U6 | .... | 62.50** | 66.50 | .... |
| Woodward, Ala. W15 | 62.00* | 62.50** | 66.50 | .... |
| Cincinnati deld. | .... | 70.20 | .... | .... |
| *Buffalo District* | | | | |
| Buffalo H1, R2 | 66.00 | 66.50 | 67.00 | 67.50 |
| N. Tonawanda, N.Y. T9 | .... | 66.50 | 67.00 | 67.50 |
| Tonawanda, N.Y. W12 | 66.00 | 66.50 | 67.00 | 67.50 |
| Boston, deld. | 77.29 | 77.79 | 78.29 | .... |
| Rochester, N.Y., deld. | 69.02 | 69.52 | 70.02 | .... |
| Syracuse, N.Y., deld | 70.12 | 70.62 | 71.12 | .... |
| *Chicago District* | | | | |
| Chicago I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| S. Chicago R2 | 66.00 | 66.50 | 66.50 | 67.00 |
| S. Chicago, Ill. W14 | 66.00 | .... | 66.50 | 67.00 |
| Milwaukee, deld. | 69.02 | 69.52 | 69.52 | 70.02 |
| Muskegon, Mich., deld. | .... | 74.52 | 74.52 | .... |
| *Cleveland District* | | | | |
| Cleveland R2, A7 | 66.00 | 66.50 | 66.50 | 67.00 |
| Akron, Ohio, deld. | 69.52 | 70.02 | 70.02 | 70.52 |
| *Mid-Atlantic District* | | | | |
| Birdsboro, Pa. B10 | 68.00 | 68.50 | 69.00 | 69.50 |
| Chester, Pa. P4 | Nom. | Nom. | Nom. | .... |
| Swedeland, Pa. A3 | 68.00 | 68.50 | 69.00 | 69.50 |
| New York, deld. | .... | 75.50 | 76.00 | .... |
| Newark, N.J., deld. | 72.69 | 73.19 | 73.69 | 74.19 |
| Philadelphia, deld. | 70.41 | 70.91 | 71.41 | 71.99 |
| Troy, N.Y. R2 | 68.00 | 68.50 | 69.00 | 69.50 |
| Boston, deld. | 75.20 | 75.70 | 76.20 | 76.70 |
| *Pittsburgh District* | | | | |
| Neville Island, Pa. P6 | 66.00 | 66.50 | 66.50 | 67.00 |
| Pittsburgh (N&S sides), Aliquippa, deld. | .... | 67.95 | 67.95 | 68.48 |
| McKees Rocks, Pa., deld. | .... | 67.60 | 67.60 | 68.13 |
| Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld. | .... | 68.26 | 68.26 | 69.79 |
| Verona, Trafford, Pa., deld. | 68.29 | 68.82 | 68.82 | 69.35 |
| Brackenridge, Pa. deld. | 68.60 | 69.10 | 69.10 | 69.63 |
| Midland, Pa. C18 | 66.00 | .... | .... | .... |
| *Youngstown District* | | | | |
| Hubbard, Ohio Y1 | .... | .... | 66.50 | .... |
| Sharpsville, Pa. S6 | 66.00 | .... | 66.50 | 67.00 |
| Youngstown Y1 | .... | .... | 66.50 | .... |
| Mansfield, Ohio, deld. | 71.30 | .... | 71.80 | 72.30 |
| Duluth I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| Erie, Pa. I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| Fontana, Calif. K1 | 75.00 | 75.50 | .... | .... |
| Geneva, Utah C11 | 66.00 | 66.50 | .... | .... |
| Granite City, Ill. G4 | 67.90 | 68.40 | 68.90 | .... |
| Ironton, Utah C11 | 66.00 | 66.50 | .... | .... |
| Minnequa, Colo. C10 | 68.00 | 68.50 | 69.00 | .... |
| Rockwood, Tenn. T3 | 62.00 | 62.50‡ | 66.50 | 67.00 |
| Toledo, Ohio I-3 | 66.00 | 66.50 | 66.50 | 67.00 |
| Cincinnati, deld. | 72.94 | 73.44 | .... | .... |

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

## PIG IRON DIFFERENTIALS

*Silicon:* Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

*Manganese:* Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

## BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

| | |
|---|---|
| Jackson, Ohio I-3, J1 | $78.00 |
| Buffalo H1 | 79.25 |

## ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

| | |
|---|---|
| Calvert City, Ky. P15 | $99.00 |
| Niagara Falls, N.Y. P15 | 99.00 |
| Keokuk, Iowa Open-hearth & Fdry, K2 | 89.00 |
| Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2 | 92.00 |

## LOW PHOSPHORUS PIG IRON, Gross Ton

| | |
|---|---|
| Birdsboro, Pa. B10 (Phos. 0.075% max) | $73.00 |
| Lyles, Tenn. T3 (Phos. 0.035% max) | 73.00 |
| Rockwood, Tenn. T3 (Phos. 0.035% max) | 73.00 |
| Buffalo H1 (Intermediate) (0.036-0.075% max) | 71.50 |
| Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max) | 71.00 |
| Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max) | 73.00 |
| Troy, N.Y. R2 (Phos. 0.075% max) | 73.00 |

# Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

| | SHEETS | | | | STRIP | BARS | | | STRUCTURAL | PLATES | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot Rolled | Cold Rolled | Galv. | Stainless Type 302 | Hot Rolled | H.R. Rounds | C.F. Rounds | H.R. Alloy 4140 | SHAPES | Carbon | Floor |
| Atlanta | 9.37 | 10.61 | 11.83 | .... | 10.85 | 9.53 | 13.24 | .... | 9.94 | 9.73 | 11.16 |
| Baltimore | 8.27 | 8.66 | 10.06 | .... | 8.28 | 8.95 | 11.80 | 16.38 | 9.53 | 8.84 | 10.43 |
| Birmingham | 9.43 | 10.20 | 10.46 | .... | 10.41 | 8.26 | 13.14 | 16.76 | 8.47 | 8.41 | 10.05 |
| Boston | 9.67 | 10.58 | 11.77 | 53.50 | 12.16 | 9.77 | 13.35 | 16.59 | 10.16 | 9.62 | 11.08 |
| Buffalo | 8.65 | 9.80 | 11.25 | 55.98 | 11.00 | 8.75 | 11.45 | 16.30 | 9.15 | 8.65 | 11.10 |
| Charlotte, N. C. | 9.87 | 11.22 | 10.30 | .... | 10.86 | 9.67 | 12.68 | .... | 9.88 | 9.82 | 11.46 |
| Chicago | 8.57 | 10.20 | 10.15 | 52.00 | 10.74 | 8.55 | 10.65 | 15.95 | 8.91 | 8.41 | 10.68 |
| Cincinnati | 8.74 | 10.26 | 10.20 | 65.30 | 11.06 | 8.87 | 11.53 | 16.27 | 9.47 | 8.79 | 11.01 |
| Cleveland | 8.57 | 9.98 | 11.24 | 56.18 | 10.86 | 8.66 | 11.25 | 16.06 | 9.30 | 8.65 | 10.92 |
| Dallas | 9.62 | 10.43 | 12.59 | .... | 11.18 | 9.03 | 12.98 | 16.95 | 9.26 | 9.35 | 11.00 |
| Detroit | 8.83 | 10.46 | 10.50 | 52.00 | 11.11 | 8.86 | 11.01 | 16.23 | 9.47 | 8.78 | 10.94 |
| Denver | 9.41 | 11.77 | 12.11 | .... | 9.86 | 10.10 | 11.47 | .... | 10.02 | 9.69 | 11.83 |
| Houston | 9.22 | 10.03 | 12.19 | 52.00 | 10.78 | 8.63 | 13.10 | 16.55 | 8.86 | 8.95 | 10.60 |
| Indianapolis | 9.01 | 10.64 | 10.59 | .... | 11.18 | 8.99 | 11.09 | 16.39 | 9.35 | 8.85 | 11.12 |
| Kansas City | 9.21 | 10.87 | 11.35 | .... | 10.87 | 9.31 | 11.57 | 15.72 | 9.80 | 9.10 | .... |
| Los Angeles | 9.59 | 11.29 | 12.20 | 61.27 | 11.29 | 9.67 | 14.20 | 17.35 | 10.54 | 9.82 | 11.79 |
| Memphis, Tenn. | 9.84 | 10.05 | .... | .... | 11.24 | 9.92 | 12.74 | .... | 10.33 | 10.12 | 11.41 |
| Milwaukee | 8.71 | 10.34 | 10.29 | .... | 10.88 | 8.69 | 10.89 | 16.09 | 9.13 | 8.55 | 10.82 |
| Moline, Ill. | 9.24 | 10.70 | 11.45 | .... | 10.90 | 9.34 | 11.15 | 16.45 | 9.83 | 9.17 | 10.96 |
| Newark, N. J. | 9.36 | 10.13 | 11.35 | .... | 11.46 | 9.74 | 13.25 | 16.40 | 10.20 | 9.51 | 11.05 |
| New York | 9.36 | 10.13 | 11.35 | 52.98 | 11.46 | 9.74 | 13.25 | 16.40 | 10.20 | 9.51 | 11.05 |
| Philadelphia | 8.85 | 10.00 | 10.89 | 52.71 | 10.85 | 9.25 | 11.95 | 16.38 | 9.45 | 9.20 | 10.45 |
| Pittsburgh | 8.57 | 9.98 | 11.13 | 52.00 | 10.84 | 8.55 | 11.25 | 15.95 | 8.91 | 8.41 | 10.68 |
| Portland, Oreg. | 10.20 | 12.05 | 12.35 | .... | 12.20 | 10.20 | 16.65 | 17.80 | 10.80 | 10.35 | 12.50 |
| St. Louis | 8.77 | 10.58 | 10.53 | .... | 10.94 | 8.77 | 11.28 | 16.33 | 9.14 | 8.62 | 10.91 |
| St. Paul | 8.84 | 9.59 | 10.84 | .... | 11.01 | 8.82 | 11.49 | 16.54 | 9.18 | 8.68 | 10.44 |
| San Francisco | 10.17 | 11.69 | 11.45 | 54.00 | 11.78 | 10.07 | 15.10 | 17.25 | 10.49 | 10.38 | 12.47 |
| Seattle | 10.51 | 11.57 | 12.50 | 54.02 | 11.95 | 9.94 | 16.20 | 17.80 | 10.65 | 10.10 | 12.73 |
| Spokane, Wash. | 10.36 | 11.42 | 12.35 | 54.02 | 11.80 | 9.79 | 16.20 | 17.80 | 10.50 | 9.95 | 12.58 |

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. x 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

# Ferroalloys

## MANGANESE ALLOYS

**Spiegeleisen:** Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

**Standard Ferromanganese:** (Mn 74-70%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va., Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

**High-Grade Low-Carbon Ferromanganese:** (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.06c to the above prices. Spot, add 0.25c.

**Medium-Carbon Ferromanganese:** (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

**Electrolytic Manganese Metal:** Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

**Siliconmanganese:** (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

## TITANIUM ALLOYS

**Ferrotitanium, Low-Carbon:** (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

**Ferrotitanium, High-Carbon:** (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

**Ferrotitanium, Medium-Carbon:** (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

## CHROMIUM ALLOYS

**High-Carbon Ferrochrome:** C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

**Charge Chrome:** Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5-8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

**Blocking Chrome:** Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

**Refined Chrome:** Cr 53-63%, C 3-5%, Si 2.5% max., 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

**Low-Carbon Ferrochrome:** Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr.; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

**Foundry Ferrochrome, High-Carbon:** (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

**Foundry Ferrosilicon Chrome:** (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

**Ferrochrome-Silicon:** Cr: 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

**Chromium Metal, Electrolytic:** Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

## VANADIUM ALLOYS

**Ferrovanadium:** Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

**Grainal:** Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

**Vanadium Oxide:** Contract, less carload lot, packed, $1.38 per lb contained $V_2O_5$ freight allowed. Spot, add 5c.

## SILICON ALLOYS

**50% Ferrosilicon:** Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

**Low-Aluminum 50% Ferrosilicon:** (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

**65% Ferrosilicon:** Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

**75% Ferrosilicon:** Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

**90% Ferrosilicon:** Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

**Silicon Metal:** (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

**Alsifer:** (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

## ZIRCONIUM ALLOYS

**12-15% Zirconium Alloy:** (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

**35-40% Zirconium Alloy:** (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

## BORON ALLOYS

**Ferroboron:** 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

**Borosil:** (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

**Carbortam:** (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

## CALCIUM ALLOYS

**Calcium-Manganese-Silicon:** (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

**Calcium-Silicon:** (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

## BRIQUETTED ALLOYS

**Chromium Briquets:** (Weighing approx 3⅝ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

**Ferromanganese Briquets:** (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

**Silicomanganese Briquets:** (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

**Silicon Briquets:** (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

**Molybdic-Oxide Briquets:** (Containing 2⅛ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

**Titanium Briquets:** Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

## TUNGSTEN ALLOYS

**Ferrotungsten:** (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

## OTHER FERROALLOYS

**Ferrocolumbium:** (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

**Ferrotantalum Columbium:** (CB 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

**SMZ Alloy:** (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

**Graphidox No. 4:** (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

**V-5 Foundry Alloy:** (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

**Simanal:** (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

**Ferrophosphorus:** (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

**Ferromolybdenum:** (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

**Technical Molybdic-Oxide:** Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

**At Mount Rushmore National Memorial** in South Dakota small fissures in the sculptured faces of Washington, Jefferson, Lincoln and Roosevelt are being sealed with granite dust and white lead. Though the granite sculpture is estimated to last for thousands of years, this preventive maintenance will keep the surfaces smooth and slow the natural erosion process. The insert shows how workmen are suspended on Union Wire Rope.

# Tuffy is an old hand at new ideas

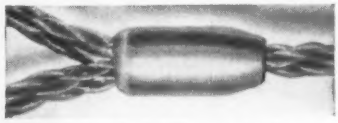
Whether it's better equipment for drilling deeper oil wells, or doing a "preventive maintenance" job like the one shown above, new needs for slings and wire rope are constantly coming along.

Tuffy meets these needs with products perfectly "tailored" to the job at hand. Products that give the ultimate in working efficiency, safety and long service life — at the ultimate low cost.

In Union research laboratories the quest is continuous for new ideas and new ways of making wire rope and slings. It's been that way for more than 30 years. Out of that research have come such important advances as Tuffy's 9-part machine-braided sling, famous for its unmatched combination of strength and flexibility.

### Here are Tuffy "extras" you get at no extra cost

**Tuffy's patented 9-part machine-braided fabric** is a marvel of strength and flexibility. It makes knotting and kinking next to impossible. If a kink should occur, it's easily smoothed out, leaving no permanent damage.



**Tuffy's pressed-on metal ferrule** gives the tucked eye splice 100% of fabric strength. It's applied under tremendous hydraulic pressure — and streamlined to eliminate snags that might injure hands and arms.

For products you trust, service you rely on, the man to see is your Tuffy Distributor. Look him up in the Yellow Pages.

## Tuffy® Tips
*— on safe use of*
Slings and Hoist Lines

### Safety in Hoisting Saves Costly Injuries

During a recent 12 months period, back injuries resulting in lost time totalled 32,643 in one state (California). Lost-time injuries caused by strain or over-exertion: 24,639. A high price to pay—in misery and money—for lifting, pushing and carrying loads.

Proper hoisting equipment, properly used and maintained, is one important answer to this injury problem. It may save your workers disabling accidents, and save you expensive absenteeism and lost production.

### Rules for Safe Use of Hoists

1. *Don't let muscles* do what a proper size hoist should do.
2. *Adequate hoists* aren't expensive. With proper slings and hoist lines, they will help a lot in reducing injuries to workers.
3. *Use the right sling* and hoist line for the job. Tuffy slings and hoist lines are tailored to every need, from the smallest block and tackle to giant cranes and other equipment.
4. *Don't assume* that all slings are right for all kinds of lifting. Your Tuffy distributor will help you select the right ones.

**FREE!**
**New Tuffy Sling Handbook**

Covers the subject from A to Z. All types, weights, dimensions, rated loads and other data for slings and sling fittings. Write **Union Wire Rope Corporation, 2160 Manchester Ave., Kansas City 26, Mo.** Specialists in high carbon wire, wire rope, braided wire fabric and stress-relieved wire and strand.

5

**UNION** Wire Rope

*Subsidiary of* ARMCO STEEL CORPORATION

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Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

# Scrap Market Remains Weak

**STEEL's composite on No. 1 heavy melting steel declines 34 cents to $32.33, but prices generally continue to fluctuate in a narrow range pending a revival in mill buying**

Scrap Prices, Page 194

• **Pittsburgh**—No. 1 heavy melting scrap is off $1 on a purchase by brokers representing a mill on the fringe of the district. Prices offered dealers were lower than those quoted recently on shipments to Warren, Ohio, but unchanged from those paid a month ago by the same consumer: $31 a ton for No. 1 heavy melting, delivered, and $26 for No. 2 heavy melting.

Trade sources think the market will weaken if the Pennsylvania Railroad strike lasts more than a few weeks. Metalworking plants served by other railroads will have few buyers for the scrap they generate because they won't be able to ship to consumers served by the Pennsylvania.

• **Philadelphia**—The movement of scrap has been hampered by the Pennsylvania Railroad strike, especially shipments of export material to the Pennsylvania piers. However, in general, volume is holding up fairly well due to greater use of trucks. The Pennsylvania strike appears to have little direct bearing on domestic trading, which continues to lag with prices unchanged.

• **New York**—Brokers' buying prices continue unchanged, with export buying still the main support of the market. The Pennsylvania Railroad strike has proved to be a nuisance to shippers, but it has not materially affected shipments.

• **Boston** — Steelmaking grades of scrap are quoted up $1 a ton in a firmer market. Prices on material generated in this area are increasingly sensitive to developments in the eastern Pennsylvania market. Exports have provided needed support of late in the absence of strong domestic demand. The cast iron grades are easy, led by a drop of $3 on mixed cupola cast. Foundries are carrying small inventories. Yard stocks are high, although operations have been curtailed for weeks.

• **Chicago**—The weaker tone of the market has developed prices which are $1 a ton lower on a few open hearth, blast furnace, and foundry grades, and up $2 on some railroad specialties. Trading is extremely limited. The price of heavy melting steel was reaffirmed when an important mill announced at the beginning of the month it would pay $33 a ton for No. 1 industrial material for September delivery—the same as it paid in August. It must be explained, however, that this consumer takes only return scrap from its customers.

No. 1 railroad heavy melting steel is down $1 on a limited mill purchase at $35.

The listlessness of the market is expected to continue until the steel-

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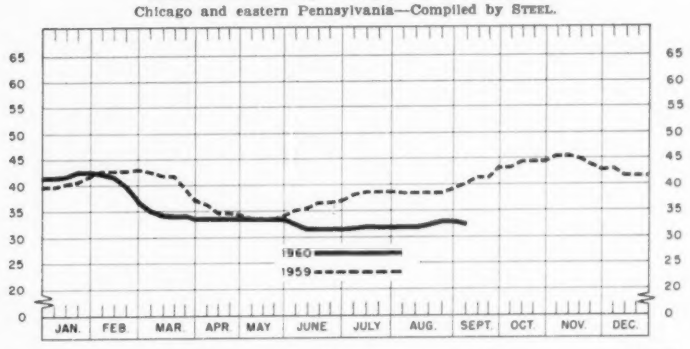
## STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.




| Sept. 7 1960 | Week Ago | Month Ago | Year Ago | August Avg. |
|---|---|---|---|---|
| $32.33 | $32.67 | $32.00 | $40.00 | $32.33 |

making rate turns up, and that may not occur until next month. Many mills are out of the market for melting material.

• **Cleveland**—Only small tonnages are being purchased by the mills and foundries. Prices are unchanged, with No. 1 heavy melting $31-$32 at Cleveland, and $33-$34 in the Valley. Quotations, however, are largely nominal in the absence of a thorough test. Some shipments into and out of plants located on the Pennsylvania Railroad have been held up by the strike.

• **Buffalo**—Local mills have placed new orders for steel scrap for September delivery at the same prices they paid last month. Included in the orders were No. 1 heavy melting at $30, No. 2 bundles at $22, and short shoveling turnings at $16-$17.

The size of the September tonnages was described as average. The new orders have served to stabilize the market at prevailing price levels, and current prices are expected to hold the next several weeks.

• **Cincinnati** — Prices are unchanged. A local mill is now buying limited tonnage for September delivery. Another district mill, however, has not yet announced a buying program for this month—the first time in years it has failed to buy on a regular schedule.

• **St. Louis**—There's little change in the scrap market here. Borings are off about $1, while stove plate is up $1. The market seems to be static. Industrial lists were off a little. There's an abundance of scrap available.

• **Birmingham** — The market continued quiet last week with prices unchanged. No revision in quotations is anticipated immediately.

• **Houston**—No. 1 heavy melting is quoted $3 higher at $34, and No. 2 heavy melting is up $2 at $31. The price on No. 2 bundles, formerly listed at $18, now is $20-$21.

The increases, based on brokers' buying prices, were reflected in the placing of a moderate order by a major Texas mill. Delivery extends through Oct. 15.

• **San Francisco**—The market continues dull, and no price changes have been recorded. Exporting has slowed down, pending announcement of new Japanese contracts for the fourth quarter. Several of the smaller mills in the area have done a little buying.

• **Seattle**—The market is unchanged from a week ago. Activity is limited, but dealers anticipate improved demand will develop shortly. Not much material has been generated the last three months, but a firming market will bring out ample reserves from the interior.

In general, the market is being supported by exports, but indications are the domestic mills will soon be in the market for tonnage.

• **Los Angeles**—The market continues quiet. Domestic mills are not buying, and new Japanese purchases await the outcome of current price negotiations. The Japanese are reportedly asking for a $2 reduction in the price of No. 1 heavy melting.

## Laminated Packaging Material Prices Cut

Price reductions of 7 to 10 per cent were announced recently by Reynolds Metals Co., Richmond, Va., on certain laminated packaging materials which combine aluminum foil and polyethylene. The reductions follow a recent decrease in the price of polyethylene flakes.

## Pig Iron . . .

Pig Iron Prices, Page 189

Demand for pig iron is improving. However, the market lacks buoyancy, and suppliers doubt that buying will rise to the levels anticipated a few weeks ago.

Production is holding steady, with some furnaces being closed down while others are being relighted. Republic Steel Corp., Cleveland, expects to resume operations this week in one of its two blast furnaces at Thomas Works, Birmingham. Both furnaces have been idle several weeks.

Bethlehem Steel Co., Bethlehem, Pa., has shut down another blast furnace at the Lackawanna, N. Y., plant. This leaves the big mill with only three active blast units out of a total of seven. Shutdown of the furnace is attributed to less demand for hot metal from the mill's open hearths and to a slow merchant iron market. With scrap prices relatively low, the mill also finds it more economical to use a higher percentage of scrap in melts, cutting down consumption of pig iron and hot metal. Only seven of the Buffalo district's 16 blast furnaces are in operation.

The strikes on several railroads forced curtailment of operations at some points. Among the properties affected was the Coke Works & Central Furnaces, Cleveland, of the American Steel & Wire Div., U. S. Steel Corp. One of two blast furnaces had been active prior to the forced closedown. At Lorain, the blast furnaces and bessemer operations were closed down.

# Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Sept. 7, 1960. *Changes shown in italics.*

## STEELMAKING SCRAP COMPOSITE

| | |
|---|---|
| Sept. 7 | $32.33 |
| Aug. 31 | 32.67 |
| Aug. Avg. | 32.33 |
| Sept. 1959 | 41.25 |
| Sept. 1955 | 44.42 |

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

### PITTSBURGH

| | |
|---|---|
| *No. 1 heavy melting* | *30.00-31.00* |
| *No. 2 heavy melting* | *26.00-27.00* |
| *No. 1 dealer bundles* | *31.00-32.00* |
| No. 2 bundles | 25.00-26.00 |
| *No. 1 busheling* | *30.00-31.00* |
| No. 1 factory bundles | 38.00-39.00 |
| Machine shop turnings | 15.00-16.00 |
| Mixed borings, turnings | 15.00-16.00 |
| Short turnings | 20.00-21.00 |
| Cast iron borings | 19.00-20.00 |
| Cut structurals: | |
| 2 ft and under | 37.00-38.00 |
| 3 ft and under | 36.00-37.00 |
| Heavy turnings | 27.00-28.00 |
| Punchings & plate scrap | 39.00-40.00 |
| Electric furnace bundles | 37.00-38.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 38.00-39.00 |
| Stove plate | 34.00-35.00 |
| Unstripped motor blocks | 25.00-26.00 |
| Clean auto cast | 37.00-38.00 |
| Drop broken machinery | 47.00-48.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 37.00-38.00 |
| Rails, 2 ft and under | 50.00-51.00 |
| Rails, 18 in. and under | 51.00-52.00 |
| Random rails | 46.00-47.00 |
| Angles, splice bars | 45.00-46.00 |
| Railroad specialties | 47.00-48.00 |
| Rails, rerolling | 53.00-54.00 |

Stainless Steel Scrap

| | |
|---|---|
| 18-8 bundles & solids | 175.00-180.00 |
| 18-8 turnings | 95.00-100.00 |
| 430 bundles & solids | 90.00-95.00 |
| 430 turnings | 50.00-55.00 |

### CHICAGO

| | |
|---|---|
| No. 1 hvy melt., indus. | 32.00-33.00 |
| No. 1 hvy melt., dealer | 30.00-31.00 |
| No. 2 hvy melting | 28.00-29.00 |
| No. 1 factory bundles | 37.00-38.00 |
| No. 1 dealer bundles | 31.00-32.00 |
| No. 2 bundles | 20.00-21.00 |
| No. 1 busheling, indus. | 32.00-33.00 |
| No. 1 busheling, dealer | 30.00-31.00 |
| *Machine shop turnings* | *14.00-15.00* |
| *Mixed borings, turnings* | *16.00-17.00* |
| *Shovel turnings* | *16.00-17.00* |
| *Cast iron borings* | *16.00-17.00* |
| *Cut structurals, 3 ft* | *34.00-35.00* |
| Punchings & plate scrap | 37.00-38.00 |

Cast Iron Grades

| | |
|---|---|
| *No. 1 cupola* | *40.00-41.00* |
| Stove plate | 35.00-36.00 |
| *Unstripped motor blocks* | *32.00-33.00* |
| *Clean auto cast* | *45.00-46.00* |
| *Drop broken machinery* | *45.00-46.00* |

Railroad Scrap

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *34.00-35.00* |
| *R.R. malleable* | *44.00-45.00* |
| *Rails, 2 ft and under* | *47.00-48.00* |
| *Rails, 18 in. and under* | *48.00-49.00* |
| *Angles, splice bars* | *41.00-42.00* |
| Axles | 53.00-54.00 |
| Rails, rerolling | 53.00-54.00 |

Stainless Steel Scrap

| | |
|---|---|
| 18-8 bundles, solids | 175.00-180.00 |
| 18-8 turnings | 90.00-95.00 |
| 430 bundles & solids | 85.00-90.00 |
| 430 turnings | 45.00-50.00 |

### DETROIT

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| No. 1 heavy melting | 23.00-24.00 |
| *No. 2 heavy melting* | *15.00-16.00* |
| No. 1 bundles | 26.00-27.00 |
| *No. 2 bundles* | *14.00-15.00* |
| No. 1 busheling | 22.00-23.00 |
| *Machine shop turnings* | *8.00-9.00* |
| *Mixed borings, turnings* | *10.00-11.00* |
| *Shovel turnings* | *11.00-12.00* |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 34.00-35.00 |
| Stove plate | 27.00-28.00 |
| Heavy breakable | 27.00-28.00 |
| Unstripped motor blocks | 19.00-20.00 |
| Charging box cast | 27.00-28.00 |
| Clean auto cast | 42.00-43.00 |

### CLEVELAND

| | |
|---|---|
| No. 1 heavy melting | 31.00-32.00 |
| No. 2 heavy melting | 23.00-24.00 |
| No. 1 factory bundles | 33.50-34.50 |
| No. 1 bundles | 31.00-32.00 |
| No. 2 bundles | 17.00-18.00 |
| No. 1 busheling | 31.00-32.00 |
| Machine shop turnings | 12.00-13.00 |
| Shovel turnings | 16.00-17.00 |
| Mixed borings, turnings | 16.00-17.00 |
| Cast iron borings | 16.00-17.00 |
| Cut foundry steel | 34.00-35.00 |
| Cut structurals, plate 2 ft and under | 37.00-38.00 |
| Low phos. punchings & plate | 31.00-32.00 |
| Alloy free, short shovel turnings | 17.00-18.00 |
| Electric furnace bundles | 33.00-34.00† |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 44.00-45.00 |
| Charging box cast | 33.00-34.00 |
| Heavy breakable cast | 30.00-31.00 |
| Stove plate | 39.00-40.00 |
| Unstripped motor blocks | 32.00-33.00 |
| Brake shoes | 35.00-36.00 |
| Clean auto cast | 50.00-51.00 |
| Burnt cast | 40.00-41.00 |
| Drop broken machinery | 50.00-51.00 |

Railroad Scrap

| | |
|---|---|
| R.R. malleable | 45.00-46.00 |
| Rails, 2 ft and under | 50.00-51.00 |
| Rails, 18 in. and under | 51.00-52.00 |
| Rails, random length | 44.00-45.00 |
| Cast steel | 38.00-39.00 |
| No. 1 railroad cast | 46.00-47.00 |
| Railroad specialties | 44.00-45.00 |
| Angles, splice bars | 46.00-47.00 |
| Rails, rerolling | 53.00-54.00 |

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| 18-8 bundles, solids | 175.00-180.00 |
| 18-8 turnings | 75.00-80.00 |
| 430 clips, bundles, solids | 90.00-95.00 |
| 430 turnings | 20.00-30.00 |

### YOUNGSTOWN

| | |
|---|---|
| No. 1 heavy melting | 33.00-34.00 |
| No. 2 heavy melting | 25.00-26.00 |
| No. 1 busheling | 33.00-34.00 |
| No. 1 bundles | 33.00-34.00 |
| No. 2 bundles | 20.00-21.00 |
| Machine shop turnings | 15.00-16.00 |
| Shovel turnings | 20.00-21.00 |
| Cast iron borings | 20.00-21.00 |
| Low phos. | 35.00-36.00 |
| Electric furnace bundles | 35.00-36.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 34.50-35.50 |

### BUFFALO

| | |
|---|---|
| No. 1 heavy melting | 29.00-30.00 |
| No. 2 heavy melting | 24.00-25.00† |
| No. 1 bundles | 29.00-30.00 |
| No. 2 bundles | 21.00-22.00 |
| No. 1 busheling | 29.00-30.00 |
| Shovel turnings | 16.00-17.00 |
| Machine shop turnings | 12.00-13.00 |
| Cast iron borings | 14.00-15.00 |
| Low phos. structurals and plate, 2 ft and under | 37.00-38.00 |

Cast Iron Grades (F.o.b. shipping point)

| | |
|---|---|
| No. 1 cupola | 40.00-41.00 |
| No. 1 machinery | 47.00-48.00 |

Railroad Scrap

| | |
|---|---|
| Rails, random lengths | 41.00-42.00 |
| Rails, 3 ft and under | 47.00-48.00 |
| Railroad specialties | 40.00-41.00 |

### CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| No. 1 heavy melting | 26.50-27.50 |
| No. 2 heavy melting | 22.50-23.50 |
| No. 1 bundles | 26.50-27.50 |
| No. 2 bundles | 17.50-18.50 |
| No. 1 busheling | 26.50-27.50 |
| Machine shop turnings | 10.00-11.00 |
| Mixed borings, turnings | 10.00-11.00 |
| Shovel turnings | 13.00-14.00 |
| Cast iron borings | 13.00-14.00 |
| Low phos. 18 in. | 35.00-36.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 36.00-37.00 |
| Heavy breakable cast | 31.00-32.00 |
| Charging box cast | 35.00-36.00 |
| Drop broken machinery | 48.00-49.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 32.00-33.00 |
| Rails, 18 in. and under | 51.00-52.00 |
| Rails, random lengths | 43.00-44.00 |

### PHILADELPHIA

| | |
|---|---|
| No. 1 heavy melting | 35.00 |
| No. 2 heavy melting | 31.00 |
| No. 1 bundles | 36.00 |
| No. 2 bundles | 24.00-25.00 |
| No. 1 busheling | 36.00 |
| Electric furnace bundles | 37.00 |
| Mixed borings, turnings | 17.00† |
| Shovel turnings | 21.00 |
| Machine shop turnings | 15.00 |
| Heavy turnings | 28.00† |
| Structurals & plates | 38.00-40.00 |
| Couplers, springs, wheels | 40.00 |
| Rail crop, 2 ft & under | 51.00-52.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 39.00 |
| Heavy breakable cast | 40.00 |
| Drop broken machinery | 50.00 |
| Malleable | 46.00 |

### NEW YORK

(Brokers' buying prices)

| | |
|---|---|
| No. 1 heavy melting | 31.00-32.00 |
| No. 2 heavy melting | 21.00-22.00 |
| No. 1 bundles | 31.00-32.00 |
| No. 2 bundles | 16.00-17.00 |
| Machine shop turnings | 7.00-8.00† |
| Mixed borings, turnings | 8.00-9.00† |
| Shovel turnings | 9.00-10.00† |
| Low phos. structurals & plates | 38.00-39.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 36.00-37.00 |
| Unstripped motor blocks | 25.00-26.00 |
| Heavy breakable | 30.00-31.00 |

Stainless Steel

| | |
|---|---|
| 18-8 sheets, clips, solids | 165.00-170.00 |
| 18-8 borings, turnings | 80.00-85.00 |
| 410 sheets, clips, solids | 55.00-60.00 |
| 430 sheets, clips, solids | 70.00-75.00 |

### BOSTON

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| *No. 1 heavy melting* | *26.00-27.00* |
| *No. 2 heavy melting* | *20.00-21.00* |
| *No. 1 bundles* | *26.00-27.00* |
| *No. 1 busheling* | *26.00-27.00* |
| Machine shop turnings | 6.00-7.00 |
| Shovel turnings | 9.00-9.50 |
| No. 1 cast | 39.00-40.00 |
| *Mixed cupola cast* | *30.00-30.50* |
| No. 1 machinery cast | 40.00-42.00 |

### BIRMINGHAM

| | |
|---|---|
| No. 1 heavy melting | 29.00-30.00 |
| No. 2 heavy melting | 24.00-25.00 |
| No. 1 bundles | 29.00-30.00 |
| No. 2 bundles | 20.00-21.00 |
| No. 1 busheling | 31.00-32.00 |
| Cast iron borings | 10.00-11.00 |
| Machine shop turnings | 16.00-17.00 |
| Shovel turnings | 18.00-19.00 |
| Bar crops and plate | 37.00-38.00 |
| Structurals & plate | 37.00-38.00 |
| Electric furnace bundles | 32.00-33.00 |
| Electric furnace: 3 ft and under | 32.00-33.00 |
| 2 ft and under | 35.00-36.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 46.00-47.00 |
| Stove plate | 46.00-47.00 |
| Unstripped motor blocks | 35.00-36.00 |
| No. 1 wheels | 37.00-38.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 31.00-32.00 |
| Rails, 18 in. and under | 45.00-46.00 |
| Rails, random lengths | 39.00-40.00 |
| Angles, splice bars | 39.00-40.00 |

### ST. LOUIS

(Brokers' buying prices)

| | |
|---|---|
| No. 1 heavy melting | 31.00 |
| No. 2 heavy melting | 28.00 |
| No. 1 bundles | 33.00 |
| No. 2 bundles | 19.00 |
| No. 1 busheling | 32.00 |
| Machine shop turnings | 9.00 |
| Shovel turnings | 11.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 43.00 |
| Charging box cast | 36.00 |
| Heavy breakable cast | 34.00 |
| Unstripped motor blocks | 36.00 |
| Clean auto cast | 44.00 |
| *Stove plate* | *37.00* |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 32.00 |
| Rails, random lengths | 37.00 |
| Rails, rerolling | 51.00 |
| Rails, 18 in. and under | 41.00 |
| Angles, splice bars | 41.00 |

### HOUSTON

(Brokers' buying prices; f.o.b. car)

| | |
|---|---|
| *No. 1 heavy melting* | *34.00* |
| *No. 2 heavy melting* | *31.00* |
| *No. 2 bundles* | *20.00-21.00* |
| *Machine shop turnings* | *nom.* |
| Low phos. plate & structurals | 37.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 34.00-34.50 |
| Heavy breakable | 25.00 |
| Foundry malleable | 31.00† |
| Unstripped motor blocks | 28.00-28.50 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 34.00-35.00 |

### LOS ANGELES

(For export)

| | |
|---|---|
| No. 1 heavy melting | 32.00 |
| *No. 2 heavy melting* | *24.00†* |
| No. 1 bundles | 27.00 |
| *No. 2 bundles* | *17.00†* |
| *Machine shop turnings* | *15.00†* |
| Shovel turnings | 15.00† |
| Cast iron borings | 15.00† |
| *Cut structurals and plate 1 ft and under* | *42.00†* |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 40.00† |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. heavy melt. | 39.00† |

### PORTLAND, OREG.

(Prepared, f.o.b. car)

| | |
|---|---|
| No. 1 heavy melting | 35.00-38.00 |
| No. 2 heavy melting | 32.00-35.00 |
| No. 2 bundles | 20.00 |
| Shovel turnings | 15.00 |
| Electric furnace bundles | 48.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 35.00 |
| Heavy breakable | 33.00 |
| Unstripped motor blocks | 33.00 |
| Stove plate (f.o.b. plant) | 20.00 |

### SEATTLE

(Prepared, f.o.b. car)

| | |
|---|---|
| No. 1 heavy melting | 38.50 |
| No. 2 (prepared for shears) | 30.00 |
| No. 1 hvy (unprepared) | 35.00 |
| No. 2 heavy melting | 35.50 |
| No. 2 hvy (unprepared) | 33.00 |
| No. 1 (prepared for shears) | 33.00 |
| No. 2 bundles | 23.00 |
| Shovel turnings | 15.00 |
| Electric furnace bundles | 48.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 35.00 |
| Heavy breakable cast | 36.00 |
| Unstripped motor blocks | 33.00 |
| Stove plate (f.o.b. plant) | 20.00 |

### SAN FRANCISCO

| | |
|---|---|
| No. 1 heavy melting | 34.00 |
| No. 2 heavy melting | 30.00 |
| No. 1 bundles | 30.00 |
| No. 2 bundles | 20.00 |
| Machine shop turnings | 14.00 |
| Mixed borings, turnings | 14.00 |
| Cast iron borings | 14.00 |
| Heavy turnings | 14.00 |
| Shovel turnings | 14.00 |
| Cut structurals, 3 ft | 40.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 cupola | 48.00 |
| Charging box cast | 34.00 |
| Stove plate | 34.00 |
| Heavy breakable cast | 28.00 |
| Unstripped motor blocks | 31.00 |
| Clean auto cast | 40.00 |
| Drop broken machinery | 40.00 |
| No. 1 wheels | 34.00 |

### HAMILTON, ONT.

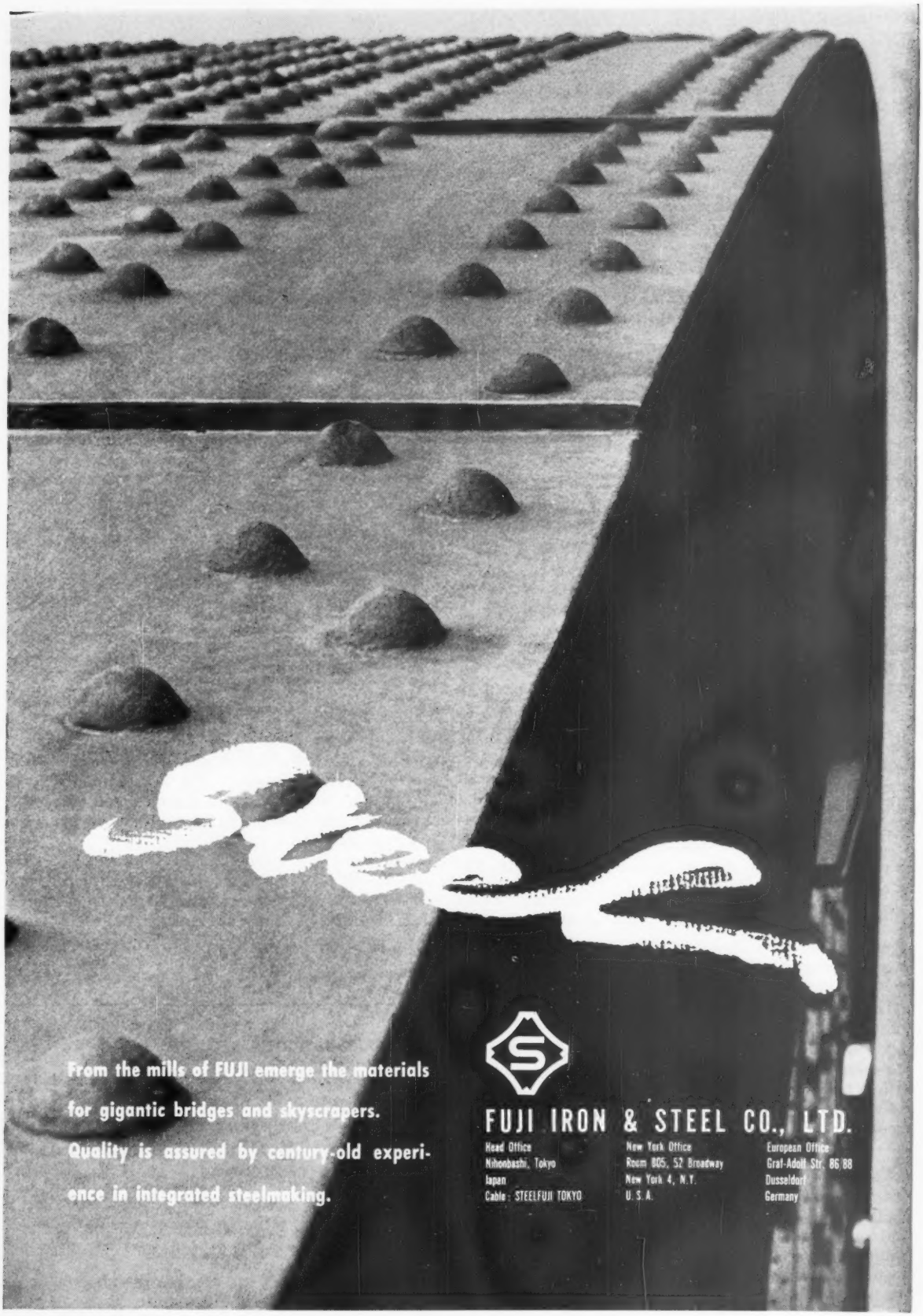
(Brokers' buying prices; net tons)

| | |
|---|---|
| No. 1 heavy melting | 25.80 |
| No. 2 hvy melt, 2 ft & under | 25.50 |
| No. 1 bundles | 25.80 |
| No. 2 bundles | 19.00 |
| Mixed steel scrap | 16.00 |
| Mixed borings, turnings | 12.00 |
| Busheling, new factory: Prepared | 25.50 |
| Unprepared | 20.45 |
| Shovel turnings | 12.00 |

Cast Iron Grades‡

| | |
|---|---|
| No. 1 machinery cast | 43.00 |

†Nominal.
‡F.o.b. Hamilton, Ont.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From the mills of FUJI emerge the materials for gigantic bridges and skyscrapers. Quality is assured by century-old experience in integrated steelmaking.
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Graf-Adolf Str. 86/88
Dusseldorf
Germany

# Cadmium Begins to Shine

**Higher imports, lower exports, better domestic demand may add up to a sparkling year. The price is stable, the supply adequate. Aluminum will do well to match '59**

Nonferrous Metal Prices, Pages 198 & 199

U. S. CADMIUM producers are confident this will be one of their best sales years in history.

Through the first half, 1960, domestic shipments of metal totaled 6,462,889 lb compared with 11,273,482 lb for all of 1959 (a record), reports the U. S. Bureau of Mines, and there's no letup in sight. In fact, the fourth quarter could easily bring a further sales upswing. Probable: A new record with 1960 shipments of 12.5 million to 13 million lb.

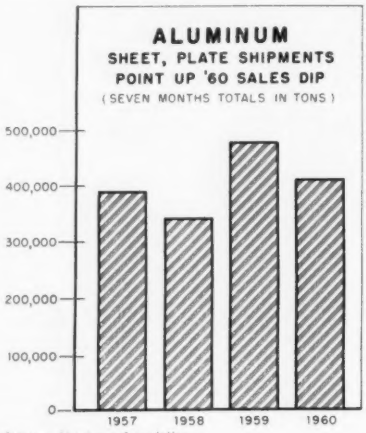
• **Why Cadmium Is Up**—Three factors stand out as being mainly responsible for the good showing in recent months. (Little sales headway was made in the '50s.)

First, exports are up. Demands of the booming economy of Western Europe are mainly responsible for exports (of metal and flue dust) climbing to 1,496,459 lb in the first half. In all of last year, they totaled only 900,000 lb.

Second, imports have fallen off for the same reason exports have gained, which gives domestic producers a bigger slice of the demand pie. Through June, imports (of metal and flue dust) were at 982,069 lb, well under the 1959 pace which saw total imports of 3,176,000 lb.

Third, over-all demand from U. S. consumers for the metal is higher this year. That is true for many of the other alloying metals as well, such as tellurium, arsenic, antimony, indium, germanium, the platinum group.

• **Cadmium's Strong Point**—Cadmium's use as a corrosion resistant plating material for iron and steel tops other uses by far. That will continue. It is also used as an alloying agent in some bearing metals, as a constituent of many solders, in atomic reactors, and in the nickel-cadmium battery. New markets include thermoelectric applications (cadmium telluride), and the plastics industry (stabilizer for pigments).



Source: Aluminum Association.

• **Price Stable**—Though the market is strong, don't look for any change in the $1.50 a pound price (for lots of 100 to 2000 lb) any time soon. Supplies are ample even though shipments are running ahead of production. There's still better than 2 million lb of metal in producer inventories. Output through the first half hit 5,429,939 lb compared with the 1959 total of 8,601,503 lb.

## Aluminum May 'Break Even'

The aluminum industry has quietly downgraded its sales forecast still another notch. Latest projection: 1960 will wind up just about on a par with 1959.

The industry started off the year full of optimism. Marketmen then predicted 1960 sales would top 1959's by 10 to 20 per cent.

They had good reason for being bullish. All indications were that 1960 would be a banner year. And aluminum had just come through a 12 month period that saw all previous records of consumption, shipments, and production shattered.

• **Behind '59**—Sales never have lived up to early expectations. This summer, they've been running at a sharply reduced rate. There has been a slight increase in bookings and shipments over the last few weeks but as yet no big improvement is in sight.

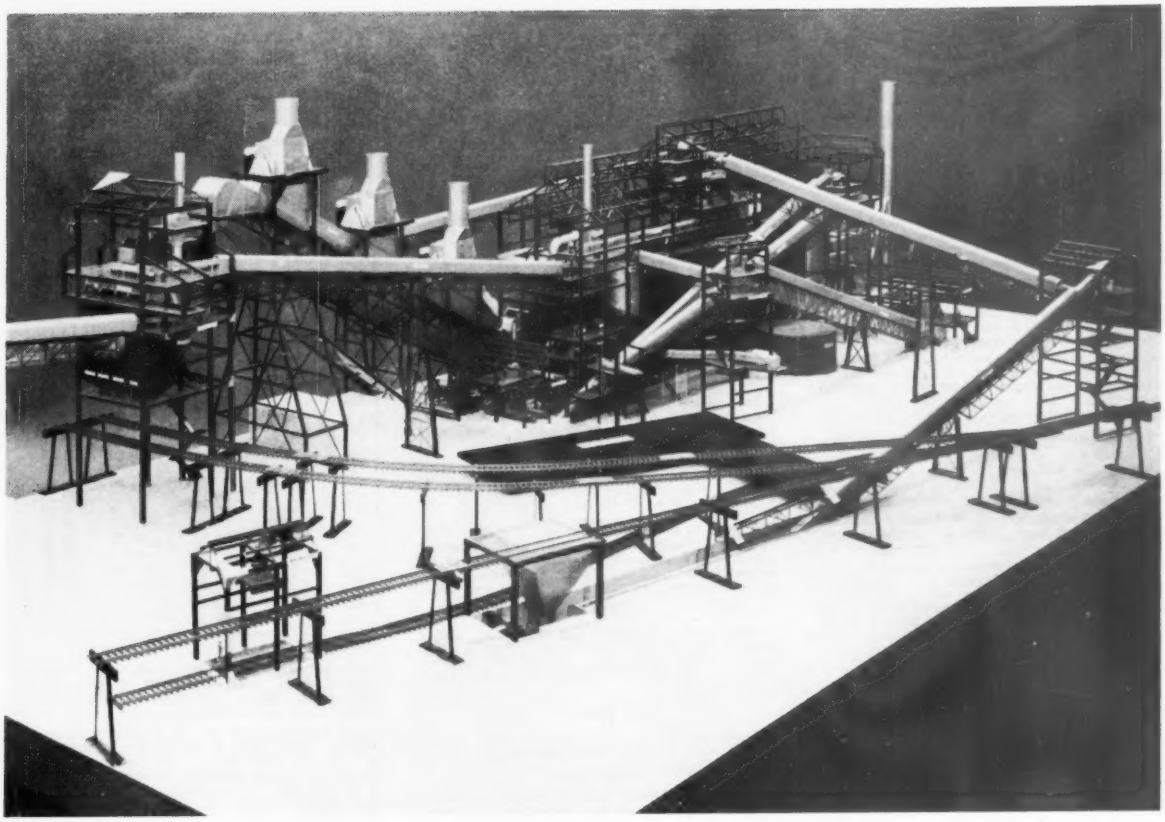
Producers expect a fourth quarter pickup mainly because of their belief customer inventories are low and that the whole economy will improve. The fourth quarter will have to be a good one if last year's shipment record is to be matched.

• **One Record Will Fall**—The industry is set to shatter one record though. Primary production should wind up close to 2,060,000 tons compared with the previous all-time high of 1,953,019 tons last year.

### NONFERROUS PRICE RECORD

| | Sept. 7 Price | Last Change | Previous Price | Aug. Avg | July Avg | Sept. 1959 Avg |
|---|---|---|---|---|---|---|
| Aluminum | 26.00 | Dec. 17, 1959 | 24.70 | 26.000 | 26.000 | 24.700 |
| Copper | 33.00 | Mar. 10, 1960 | 33.00–35.00 | 33.000 | 33.000 | 31.500 |
| Lead | 11.80 | Dec. 21, 1959 | 12.30 | 11.800 | 11.800 | 12.800 |
| Magnesium | 35.25 | Aug. 13, 1956 | 33.75 | 35.250 | 35.250 | 35.250 |
| Nickel | 74.00 | Dec. 6, 1956 | 64.50 | 74.000 | 74.000 | 74.000 |
| Tin | 102.375 | Sept. 7, 1960 | 102.625 | 102.815 | 103.565 | 102.440 |
| Zinc | 13.00 | Jan. 8, 1960 | 12.50 | 13.000 | 13.000 | 11.360 |

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingot, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.



Scale model of the newest Dravo-Lurgi sintering plant, now under construction for Interlake Iron Corporation.

# 47,500 tons per day

Dravo-Lurgi Sintering and Pelletizing Plants, some still under construction, will produce in excess of 15,500,000 tons of sinter or pellets per year.

Listed here are the major Dravo-Lurgi projects:

| In Operation | For | No. Machines | Capacity |
|---|---|---|---|
| Gary | United States Steel Corp. | 3 | 15,000 tpd |
| Saxonburg | United States Steel Corp. | 3 | 15,000 tpd |
| Ashland | Armco Steel Corp. | 1 | 2,400 tpd |
| Trenton #1 | McLouth Steel Co. | 1 | 2,100 tpd |
| Trenton #2 | McLouth Steel Co. | 1 | 2,100 tpd |
| Copper Cliff, Ont. | International Nickel Co. | 1 | 1,100 tpd |
| **Under Construction** | | | |
| Chicago | Interlake Iron Corporation | 1 | 3,300 tpd |
| Aliquippa | Jones & Laughlin Steel Corporation | 1 | 6,500 tpd |
| | | Total: | 47,500 tpd |

In addition to these complete plants, Dravo has built sinter coolers of several types for a number of existing sinter machines. These coolers are designed to reduce sinter temperatures at the maximum rate consistent with minimum shattering, and unload the cooled sinter without further breaking.

This extensive experience with sintering and pelletizing plant design and construction can be brought to bear on your specific requirements. We will be glad to discuss the latest techniques in ore agglomeration with you or your staff. Write or phone Dravo Corporation, Pittsburgh 22, Pa.

**DRAVO**
CORPORATION

Blast furnace blowers • boiler and power plants • bridge sub-structures • docks and unloaders • dredging • fabricated piping foundations • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

# Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

## PRIMARY METALS AND ALLOYS

**Aluminum:** 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

**Aluminum Alloy:** No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

**Antimony:** R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

**Beryllium:** 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

**Beryllium Aluminum:** 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

**Beryllium Copper:** 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

**Bismuth:** $2.25 per lb, ton lots.

**Cadmium:** Sticks and bars, $1.50 per lb deld.

**Cobalt:** 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

**Columbium:** Powder, $55-85 per lb nom.

**Copper:** Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

**Germanium:** First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

**Gold:** U. S. Treasury, $35 per oz.

**Indium:** 99.9%, $2.25 per troy oz.

**Iridium:** $70-75 per troy oz nom.

**Lead:** Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

**Lithium:** 1 lb or 2 lb ingots, less than 24 lb, $11 per lb f.o.b. Minneapolis; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

**Magnesium:** Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

**Magnesium Alloy:** AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

**Mercury:** Open market, spot, New York, $208-210 per 75 lb flask.

**Molybdenum:** Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

**Nickel:** Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 73.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

**Osmium:** $70-90 per troy oz nom.

**Palladium:** $24-26 per troy oz.

**Platinum:** $82-85 per troy oz from refineries.

**Radium:** $18-21.50 per mg radium content, depending on quantity.

**Rhodium:** $137-140 per troy oz.

**Ruthenium:** $55-60 per troy oz.

**Selenium:** $6.50-7 per lb, commercial grade.

**Silver:** Open market, 91.375 per troy oz.

**Sodium:** Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

**Tantalum:** Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

**Tellurium:** $3.50-5 per lb, 100 lb or more.

**Thallium:** $7.50 per lb.

**Tin:** Straits, N. Y., spot, 102.375; prompt, 102.25.

**Titanium:** Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

**Tungsten:** Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.35-4.50.

**Zinc:** Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

**Zirconium:** Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

## SECONDARY METALS AND ALLOYS

**Aluminum Ingot:** Piston alloys, 26.25-28.00; No. 12 foundry alloy (No. 2 grade), 23.75-24.25; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 26.75-27.75; 108 alloy, 24.25-24.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

**Brass Ingot:** Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

**Magnesium Alloy Ingot:** AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

## NONFERROUS PRODUCTS

### BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

### COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

### LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

### TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

### ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

### ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $12.50-22.00; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

### NICKEL, MONEL, INCONEL

| | "A" Nickel | Monel | Inconel |
|---|---|---|---|
| Sheets, C.R. | 138 | 120 | 138 |
| Strip, C. R. | 124 | 108 | 138 |
| Plate, H.R. | 130 | 110 | 126 |
| Rod, Shapes, H.R. | 107 | 89 | 109 |
| Seamless Tubes | 157 | 129 | 200 |

### ALUMINUM

(Selected products and sizes)

**Flat Sheets:** 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

| Thickness Range (in.) | Width (in.) | Length Range (in.) | Price Range |
|---|---|---|---|
| 0.250-0.136 | 24-72 | 72-180 | 45.40-48.00 |
| 0.136-0.096 | 24-72 | 72-180 | 45.90-48.80 |
| 0.096-0.077 | 24-72 | 72-180 | 46.40-50.30 |
| 0.077-0.068 | 24-72 | 72-180 | 46.90-52.10 |
| 0.068-0.061 | 24-72 | 72-180 | 46.90-55.00 |
| 0.061-0.048 | 24-72 | 72-180 | 47.40-57.70 |
| 0.048-0.038 | 24-72 | 72-180 | 47.90-60.50 |
| 0.038-0.030 | 24-72 | 72-180 | 48.40-65.30 |
| 0.030-0.024 | 24-72 | 72-180 | 48.90-67.20 |
| 0.024-0.019 | 24-60 | 72-180 | 49.40-59.90 |
| 0.019-0.017 | 24-48 | 72-144 | 50.30-57.00 |
| 0.017-0.015 | 24-48 | 72-144 | 51.20-58.00 |
| 0.015-0.014 | 24-36 | 72-144 | 52.30 |
| 0.014-0.012 | 24-36 | 72-144 | 53.50 |
| 0.012-0.011 | 24-36 | 72-114 | 54.60 |
| 0.011-0.0095 | 24-46 | 72-144 | 56.20 |
| 0.0095-0.0085 | 24-36 | 72-96 | 57.50 |
| 0.0085-0.0075 | 24-36 | 72-96 | 59.20 |
| 0.0075-0.007 | 24-36 | 72-96 | 60.80 |
| 0.007-0.006 | 24-36 | 72-96 | 62.50 |

### ALUMINUM (continued)

**Plates and Circles:** Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

| Alloy | Plate Base | Circle Base |
|---|---|---|
| 1100, 3003-F | 44.60 | 50.90 |
| 5050-F | 45.70 | 50.50 |
| 3004-F | 46.70 | 52.40 |
| 5052-F | 47.30 | 53.10 |
| 6061-T6 | 47.80 | 53.90 |
| 2024-T4* | 51.80 | 58.90 |
| 7075-T6* | 60.50 | 67.90 |

*24-48 in. width or diam., 72-180 in. lengths.

**Screw Machine Stock:** 30,000 base, 12 ft lengths

| Diam | Round | | Hexagonal | |
|---|---|---|---|---|
| (in.)* | 2011-T3 | 2017-T4 | 2011-T3 | 2017-T4 |
| 0.125 | 74.90 | 77.30 | .... | .... |
| 0.188 | 63.20 | 63.20 | .... | 80.10 |
| 0.250 | 60.00 | 62.60 | 72.70 | 74.10 |
| 0.375 | 59.20 | 63.80 | 71.00 | 72.00 |
| | 2011-T3 | 2017-T451 | 2011-T3 | 2017-T451 |
| 0.500 | 59.20 | 63.80 | 71.00 | 72.00 |
| 0.625 | 59.20 | 63.80 | 67.80 | 67.90 |
| 0.750 | 57.70 | 62.00 | 61.60 | 63.80 |
| 0.875 | 57.70 | 62.00 | 61.60 | 63.80 |
| 1.000 | 57.70 | 62.00 | 61.60 | 63.80 |
| 1.125 | 55.30 | 59.50 | 59.50 | 61.50 |
| 1.250 | 55.30 | 59.50 | 59.50 | 61.50 |
| 1.375 | 55.30 | 59.50 | 59.50 | 61.50 |
| 1.500 | 55.30 | 59.50 | 59.50 | 61.50 |
| 1.625 | 53.00 | 56.70 | .... | 59.30 |
| 1.750 | 53.00 | 56.70 | 58.30 | 59.30 |
| 1.875 | 53.00 | 56.70 | .... | 59.30 |
| 2.000 | 53.00 | 56.70 | 58.30 | 59.30 |
| 2.250 | 51.50 | 55.00 | .... | 59.30 |
| 2.500 | 51.50 | 55.00 | .... | 59.30 |
| 2.750 | 49.90 | 53.20 | .... | 59.30 |
| 3.000 | 49.00 | 53.20 | .... | 59.30 |
| 3.250 | .... | 53.20 | .... | .... |
| 3.375 | .... | 53.20 | .... | .... |

*Selected sizes.

**Forging Stock:** Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

**Pipe:** ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

**Extruded Solid Shapes:**

| Factor | Alloy 6063-T5 | Alloy 6062-T6 |
|---|---|---|
| 1-14 | 45.30-46.80 | 54.00-60.00 |
| 15-17 | 45.30-46.80 | 56.50-61.80 |
| 18-23 | 45.80-47.50 | 58.60-67.60 |
| 24-32 | 45.80-47.50 | 66.80-81.50 |
| 33-38 | 49.50-52.20 | 85.10-96.60 |
| 39-44 | 59.80-63.60 | 102.00-124.00 |

### MAGNESIUM

**Sheets and Plates:** AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.80. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

**Extruded Solid Shapes:**

| Factor | Com. Grade (AZ31C) | Spec. Grade (AZ31B) |
|---|---|---|
| 6-8 | 65.30-67.60 | 94.60-87.40 |
| 12-14 | 65.30-67.60 | 85.70-88.00 |
| 24-26 | 66.10-68.40 | 90.60-91.30 |
| 36-38 | 71.50-75.30 | 104.20-105.30 |

## NONFERROUS SCRAP

### DEALERS' BUYING PRICES

**Copper and Brass:** No. 1 heavy copper and wire 23.00-23.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 18.00-18.50; No. 1 composition red brass, 17.00-17.25; No. 1 com-

## BRASS MILL PRICES

| | MILL PRODUCTS a | | | | SCRAP ALLOWANCES e (Based on copper at 30.00c) | | |
|---|---|---|---|---|---|---|---|
| | Sheet, Strip, Plate | Rod | Wire | Seamless Tubes | Clean Heavy | Rod Ends | Clean Turnings |
| Copper | 50.00b | 54.86c | .... | 58.32 | 29.000 | 29.000 | 28.250 |
| Yellow Brass | 50.57 | 36.06d | 50.86 | 54.23 | 22.250 | 21.250 | 20.250 |
| Low Brass, 80% | 53.53 | 53.22 | 53.82 | 57.00 | 24.750 | 24.500 | 24.000 |
| Red Brass, 85% | 54.58 | 54.27 | 54.87 | 58.14 | 25.750 | 25.500 | 25.000 |
| Com. Bronze, 90% | 56.17 | 55.86 | 56.46 | 59.48 | 26.750 | 26.500 | 26.000 |
| Manganese Bronze | 58.86 | 52.21 | 62.69 | .... | 20.875 | 20.625 | 19.875 |
| Muntz Metal | 53.20 | 48.26 | .... | .... | 20.875 | 20.625 | 20.125 |
| Naval Brass | 56.12 | 48.68 | 61.43 | 58.78 | 20.750 | 20.500 | 20.000 |
| Silicon Bronze | 62.86 | 61.80 | 62.15 | 80.79 | 28.375 | 28.125 | 27.375 |
| Nickel Silver, 10% | 65.98 | 68.06 | 68.06 | .... | 26.875 | 26.625 | 14.987 |
| Phos. Bronze | 77.44 | 78.19 | 77.69 | 79.37 | 29.875 | 29.625 | 28.625 |

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.50-15.75; new brass clippings, 14.00-14.50; light brass, 10.50-10.75; heavy yellow brass, 11.50-11.75; new brass rod ends, 12.00-12.75; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

**Lead:** Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

**Monel:** Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

**Nickel:** Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

**Zinc:** Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

**Aluminum:** Old castings and sheets, 10.50-11.00; clean borings and turnings, 6.50-7.00; segregated low copper clips, 14.00-14.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

**Aluminum:** Old castings and sheets, 11.50-12.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.00-16.50; segregated high copper clips, 14.50-15.00; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

(Cents per pound, Cleveland)

**Aluminum:** Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

**REFINERS' BUYING PRICES**

(Cents per pound, carlots, delivered refinery)
**Beryllium Copper:** Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

**Copper and Brass:** No. 1 heavy copper and wire, 27.25; No. 2 heavy copper and wire, 25.50; light copper, 23.25; refinery brass (60% copper) dry copper content, 23.50.

**INGOTMAKERS' BUYING PRICES**

**Copper and Brass:** No. 1 heavy copper and wire, 27.25; No. 2 heavy copper and wire, 25.50; light copper, 23.75; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 17.50.

## PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

**ANODES**

**Cadmium:** Special or patented shapes, $1.50.

**Copper:** Flat-rolled, 50.04; oval, 46.50. 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

**Nickel:** Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

**Tin:** Bar or slab, less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

**Zinc:** Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

**CHEMICALS**

**Cadmium Oxide:** $1.50 per lb in 100-lb drums.

**Chromic Acid (flake):** 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

**Copper Cyanide:** 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

**Copper Sulphate:** 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

**Nickel Chloride:** 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

**Nickel Sulphate:** 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

**Sodium Cyanide (Cyanebrik):** 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

**Sodium Stannate:** Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

**Stannous Chloride (Anhydrous):** 25 lb, 155.60; 100 lb, 150.70; 400 lb, 148.30; 800-19,900 lb, 107.40; 20,000 lb or more, 101.30.

**Stannous Sulphate:** Less than 50 lb, 140.70; 50 lb, 110.70; 100-1900 lb, 108.70; 2000 lb or more, 106.70.

**Zinc Cyanide:** 100-200 lb, 59.00; 300-900 lb, 57.00.

# Ores

**Lake Superior Iron Ore**

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

| | |
|---|---|
| Mesabi bessemer | $11.60 |
| Lump, ½ in. and up | 12.85 |
| Fines, under ½ in. | 10.72 |
| Mesabi nonbessemer | 11.45 |
| Old Range bessemer | 11.85 |
| Old Range nonbessemer | 11.70 |
| Open-hearth lump | 12.70 |
| High phos. | 11.45 |

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

**Eastern Local Iron Ore**

Cents per unit, deld. E. Pa.

| | |
|---|---|
| New Jersey, concentrates | nom. |

**Foreign Iron Ore**

Cents per unit

| | |
|---|---|
| Swedish basic, 65%, c.i.f. Atlantic ports | 23.00† |
| Chilean, 62-65%, c.i.f. Atlantic ports | 22.00 |
| Brazilian, 68.5%, f.o.b. vessel, Victoria, per ton | $11.50 |

**Tungsten Ore**

Net ton, unit

| | |
|---|---|
| Foreign wolframite, good commercial quality | $19.75-20.00 |
| Domestic, concentrates, f.o.b. milling points | 22.00-23.00 |

*Before duty. †Nominal.

**Manganese Ore**

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

**Chrome Ore**

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

*Indian and Rhodesian*

| | |
|---|---|
| 48% 3:1 | $34.00-35.00† |
| 48% no ratio | 25.00-26.00† |

*South African Transvaal*

| | |
|---|---|
| 44% no ratio | 18.75† |
| 48% no ratio | 24.00-26.00† |

*Turkish*

| | |
|---|---|
| 48% 3:1 | 36.00-37.00† |

*Domestic*

Rail nearest seller

| | |
|---|---|
| 18% 3:1 | 30.00 |

**Molybdenum**

| | |
|---|---|
| Sulfide concentrate, per lb of Mo content, mines, unpacked | $1.23 |

**Antimony Ore**

Per short ton unit of Sb content, c.i.f. seaboard

| | |
|---|---|
| 55-60% | $2.50-2.80 |
| 60-65% | 2.80-3.20 |

**Vanadium Ore**

Cents per lb $V_2O_5$

| | |
|---|---|
| Domestic | 31.00 |

†Nominal.

# Metallurgical Coke

Price per net ton

**Beehive Ovens**

| | |
|---|---|
| Connellsville, Pa., furnace | $14.75-15.25 |
| Connellsville, Pa., foundry | 18.00-18.50 |

**Oven Foundry**

| | |
|---|---|
| Birmingham, ovens | $30.35 |
| Cincinnati, deld. | 33.34 |
| Buffalo, ovens | 32.00 |
| Chattanooga, Tenn., ovens | 30.80 |
| Detroit, ovens | 32.00 |
| Pontiac, Mich., deld. | 33.95 |
| Saginaw, Mich., deld. | 35.53 |
| Erie, Pa., ovens | 32.00 |
| Everett, Mass., ovens: New England, deld. | 33.55* |
| Indianapolis, ovens | 31.25 |
| Ironton, Ohio, ovens | 30.50 |
| Cincinnati, deld. | 33.54 |
| Kearny, N. J., ovens | 31.25 |
| Milwaukee, ovens | 32.00 |
| Neville Island (Pittsburgh), Pa., ovens | 30.75 |
| Painesville, Ohio, ovens | 32.00 |
| Cleveland, deld. | 34.19 |
| Philadelphia, ovens | 31.00 |
| St. Louis, ovens | 33.00 |
| St. Paul, ovens | 31.25 |
| Chicago, deld. | 34.68 |
| Swedeland, Pa., ovens | 31.00 |
| Terre Haute, Ind., ovens | 31.25 |

*Within $5.15 freight zone from works.

# Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

| | |
|---|---|
| Pure benzene | 31.00 |
| Xylene, industrial grade | 29.00 |
| Creosote | 24.00 |
| Naphthalene, 78 deg. | 6.00 |
| Toluene, one deg. (deld. east of Rockies) | 25.00 |

Cents per lb, f.o.b. tank cars or tank trucks, deld.

| | |
|---|---|
| Phenol, 90 per cent grade | 14.75 |

Per net ton bulk, f.o.b. cars or trucks, plant.

| | |
|---|---|
| Ammonium sulfate, regular grade | $32.00 |

# Refractories

**Fire Clay Brick (per 1000 pieces*)**

*High-Heat Duty:* Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

*Super-Duty:* Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

**Silica Brick (per 1000 pieces*)**

*Standard:* Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $163; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

*Super-Duty:* Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

**Semisilica Brick (per 1000 pieces*)**

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

**Ladle Brick (per 1000 pieces*)**

*Dry-Pressed:* Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

**High-Alumina Brick (per 1000 pieces*)**

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.


## CLASSIFIED

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Available for immediate sale, 40,000 square feet cast iron floor plating, 2' x 3' x 1".

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Should be 30-45 years, have 5 to 8 years foundry supervision and 3 years as foundry superintendent, degree in mechanical engineering or metallurgy, experience with non-ferrous alloys. Will direct pattern making, core room, molding, melting and cleaning and some labor relations. An excellent position with long established leading Midwest manufacturer. Send detailed resume to Box 870, STEEL, Penton Bldg., Cleveland 13, Ohio.

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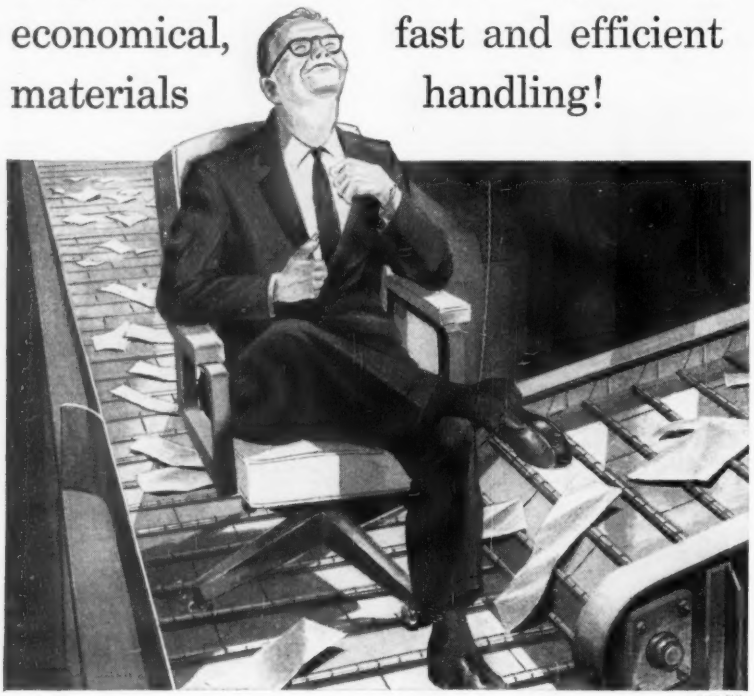

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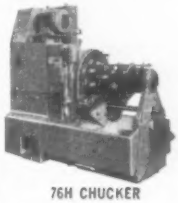
*the special meaning*

*of* **BAIRD**



76H CHUCKER

In the machine tool business there's a saying that you're in real trouble when you begin to take the quality and performance of your machinery or tooling for granted. It's simply impossible to stand pat on a design merely because the bugs have been ironed out and the customers seem happy.

It's more than just a natural concern about competition that keeps the Baird design group looking for the better way. Although a good deal of our engineering effort is applied to specific customer tooling requirements, the bulk of our time is devoted to continual reviews of our current machinery line and ways to improve it.

Transfer Press

Take our Chucker, for instance. The new 78-H, 8-spindle automatic incorporates a universal cross-slide that's absolutely unique. We have a brand new inclinable Four-Slide unit on the market that is probably the most versatile machine of its type available. The Model 00 four-slide unit has a new vertical swing bed that's sure to save time and work for the operator. Several new attachments for our Transfer Press have opened tremendous new fields of application, eliminating complicated and expensive secondary operations.

The special meaning of Baird? To those of us in Design, it's the ever-present urge never to leave well enough alone. There is always a better way to do it and it's up to Baird to find it.

**BURTON F. LEWIS**

*Burton F. Lewis*

**BAIRD**

**THE BAIRD MACHINE COMPANY**

1300 Stratford Avenue, Stratford, Conn.

# SHEFFIELD Aluminized Wire

## Steps up Mileage Between Engine Overhauls

**SHEFFIELD**
ARMCO
**Aluminized Wire**

- AISI specifications 1006 to 1050
- 16-gauge through 6-gauge
- Packed in coils or on Sheffield Kone-Paks that give you on one continuous spool the equivalent of several ordinary coils of wire

*WRITE FOR FREE SAMPLE*

Longer piston wear at lower cost is a sure thing with Gillett and Eaton Insert Pistons. Why? For one reason, because they have a pre-shaped steel wire cast right in the piston wall where the top ring is located.

That wire insert is made of Sheffield Aluminized Wire. It's the only wire of its kind that stands up against excessive work hardening in this application. This is because of the extremely tight bond of aluminum coating on steel wire, made possible by Sheffield's patented method of making the wire. When cast in the piston wall, the aluminized wire forms a tight bond with the aluminum in which it is inserted. The exclusive Gillett & Eaton steel wire insert cuts top ring groove wear and greatly increases mileage between overhauls.

Whatever your use of aluminized wire, Sheffield metallurgical skill, engineering excellence and strict quality control assure you the wire that will do the best job. For further information, get in touch with your nearest Sheffield office.

## SHEFFIELD DIVISION

*Sheffield Plants in Kansas City, Tulsa and Houston*

ARMCO

ARMCO STEEL CORPORATION

OTHER DIVISIONS AND SUBSIDIARIES: Armco Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

# Why is this steel coil half air?

To provide an air-space between each lamination of the coil! This is the key to a revolutionary new method of controlling the composition of steel, known as the Open Coil Process of Gas Alloying. By "opening" the coil and exposing the entire surface to active gases, many exciting things happen to the composition of steel. To name a few: Low grade Bessemer and open hearth steels can be converted to premium products, rimmed steel can be upgraded by decarburization, renitrogenizing and denitrogenizing practices are greatly simplified. The potential is limitless! Mill executives are calling the Open Coil Process "the greatest advance in steel processing in our generation". We'll have complete data at our Booths 78 and 79 at the AISE Show, or you can get information immediately by writing direct.

**Lee Wilson*** **ENGINEERING COMPANY, INC.**

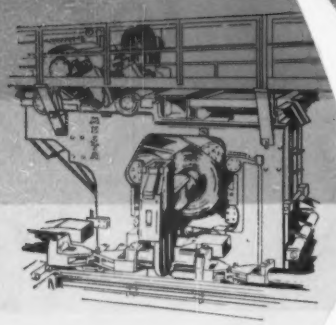
20005 LAKE ROAD • CLEVELAND 16, OHIO

HIGH PRODUCTION ANNEALING SYSTEMS

*MAKE THE BEST METALS BETTER*

* ORIGINATORS AND LEADING PRODUCERS OF OPEN COIL AND SINGLE STACK FURNACES

MESTA 80" Continuous Hot Strip Mill
Finishing Stands operating at
Fairless Works, U. S. Steel Corporation



# HOT STRIP MILLS

Designed and Built by MESTA

*Designers and Builders of Complete Steel Plants*

**MESTA MACHINE COMPANY**

PITTSBURGH, PENNSYLVANIA